USAID
FROM THE AMERICAN PEOPLE

USAID MUNICIPAL ENERGY REFORM PROJECT IN UKRAINE

PRACTICES OF IMPLEMENTATION OF EU DIRECTIVE 2012/27 REGARDING ENERGY MANAGEMENT SYSTEMS AND ENERGY AUDIT

Review Report

August 2016

August 2016
This document was produced for review by the United States Agency for International Development (USAID).
It was prepared by the USAID Municipal Energy Reform Project in Ukraine.

USAID MUNICIPAL ENERGY REFORM PROJECT IN UKRAINE

PRACTICES OF IMPLEMENTATION OF EU DIRECTIVE 2012/27 REGARDING ENERGY MANAGEMENT SYSTEMS AND ENERGY AUDIT

Review Report

Project title	Project ID.	Date
PRACTICES OF IMPLEMENTATION OF EU DIRECTIVE 2012/27 REGARDING ENERGY MANAGEMENT SYSTEMS AND ENERGY AUDIT **Review Report**	**13210**	29 August 2016
Client	Composed by	Number of pages / annexes
MERP Project in Ukraine	ENSI AS	43

LIST OF CONTENT

GLOSSARY OF TERMS

BAFA	Interpretation Guideline of the Federal Office of Economics and Export Control of Germany
BfEE	The Federal Office for Energy Efficiency of Germany
BMWi	Federal Ministry for Economic Affairs and Energy of Germany
EBRD	European Bank for Reconstruction and Development
EDL-G	Act on Energy Services and Energy Efficiency Measures of Germany
EE	Energy Efficiency
EED	Energy Efficiency Directive 2012/27/EU of the European Parliament and the Council
EESI	Energy Efficiency in the Sawmill Industry network of Sweden
EnMS	Energy Management System
EPBD	Energy Performance of Building Directive 2010/31/EU of the European Parliament and the Council
EPC	Energy Performance Contract
ESD	Energy Services Directive 2006/32/EU
ETS	Emissions Trading Systems
ESCO	Energy Service Contract
EU	European Union
FIT	Feed-in-tariffs
IPCC	Integrated Pollution Prevention and Control
IRR	Internal Rate of Return
MS	Member States of the European Union
NEEAP	National Energy Efficiency Action Plan
NEEAPdBD	National Action Plan on Energy Efficiency of Germany (Nationaler Energieeffizienz-Aktionsplan der Bundesrepublik Deutschland)
NPV	Net Present Value
PFE	Programme for improving energy efficiency in energy intensive industries in Sweden
RES	Renewable Energy Sources
SEDA	Sustainable Energy Development Agency of Bulgaria
SIEA	Slovak Innovation and Energy Agency
SMEs	Small and Medium Enterprises

1 EXECUTIVE SUMMARY

This Report is a desktop review of the practices of implementation of EU Directive 2012/27 on energy efficiency in EU member states, regarding practices and incentives for introduction of energy audits and energy management systems in the housing and communal services sector and municipalities. These are related to the obligations and requirements of Article 8 of the EU Energy Efficiency Directive (2012/27/EU). The cases of 5 countries - Bulgaria, Germany, Slovakia, Sweden and the Czech Republic - are used to look in more details into the legislative framework and implementation practices as relevant examples.

As a Contracting Party of the Energy Community Treaty, Ukraine has committed to adoption of the EU's legislation, the so-called "acquis communautaire", in energy and related areas. With Decision D/2015/08/MC-EnC, the Energy Efficiency Directive 2012/27/EU was incorporated into the acquis to be adopted by the Energy Community Contracting Parties on 16 Oct 2015. The Contracting Parties have to transpose the new Directive by 15 October 2017. Until that date, the Energy end-use efficiency and energy services Directive (2006/32/EC) remains in force.

The objective of the review is to create a basis for developing recommendations as to the use of relevant practices and approaches in Ukraine. The recommendations will refer to the preparation of the legal acts to facilitate implementation of the energy audits and energy management in Ukraine.

The Report is built on publicly available information. Major information sources compile official documents and reports of the European Commission, of the selected countries and some supporting professional organisations, all listed in section References.

Chapter 2 provides brief overview of EU Energy Efficiency Directive (EED) 2012/27/EU. The provisions for energy audits and energy management systems in EED is given in Article 8 – which is described in Chapter 3 of this Report.

General overview of implementation of Article 8 of EED in EU Member States is given in Chapter 4. Most of the European Member States have transposed Article 8 into national legislation, although with some delays. However, the studies reviewed indicate different level of transposition and concretization of requirements across Member States. This chapter describes that Member States may chose different approaches and exceptions in some aspects of implementation of the Article 8 of EED.

Specific review of implementation of Article 8 of EED in Bulgaria, Germany, Slovakia, Sweden and the Czech Republic is given in Chapter 5. The summary table giving the main highlights of the review of the implementation practices of Article 8 of EED in selected countries is presented below:

Bulgaria	Germany	Slovakia	Sweden	Czech Republic
Legislation				
− New Energy Efficiency Act/2015 − Ordinance on energy consumption, energy performance and energy audits of industrial systems,	− Act on Energy Services and Energy Efficiency Measures (EDL-G), 2010 – amendment 2015 − Interpretation Guideline of the	− New Energy Efficiency Act 321/2014 − Decree 179/2015 on energy audits − Decree 88/2015 on assessment,	− Act on Energy Audits in Large Enterprises (SFS 2014:266) − Regulation SFS 2014:347 on energy audits in large	− Amendment 103/2015 of the Act on Energy Efficiency − Decree 480/2012 on energy audit and assessment − Decree 118/2013

Bulgaria	Germany	Slovakia	Sweden	Czech Republic
2009 − Ordinance on energy auditors, 2014	Federal Office of Economics and Export Control (BAFA) − National Action Plan on Energy Efficiency (NEEAPdBD)	calculation method of efficiency of energy sources and distribution − Decree 13/2016 on monitoring system, monitoring method and rules and data processing	companies − Instructions by the Swedish Energy Agency (STEMFS 2014:2) − FAQ document by SEA	on energy specialists
Supervision				
Sustainable Energy Development Agency (SEDA)	Federal Office for Energy Efficiency (BfEE)	Ministry of Economy of the Slovak Republic / Slovak Innovation and Energy Agency (SIEA), State Inspection	Swedish Energy Agency	Ministry of Industry and Trade, State Energy Inspection
Implementation for large enterprises				
▪ **scope**				
Non-SMEs according to EU definition - enterprises employing less than 250 persons and annual turnover of less than 97.5m leva (~50m EUR), and/or value of assets less than 84m leva (~43m EUR).	Companies with economic activity and 250 or more employees or less than 250 employees, but more than EUR 50m turnover and EUR 43m balance sheet	Companies which have more than 250 employees and turnover over 50 million euro and/or an annual balance sheet total exceeding 43 million EUR	Enterprises having at least 250 employees and an annual turnover of more than EUR 50 million or an annual balance sheet total of more than EUR 43 million	Non-SMEs according to EU definition - companies which have more than 250 employees and turnover over 50 million euro and/or an annual balance sheet total exceeding 43 million EUR
▪ **exemptions**				
Enterprises and industrial systems, which implement an energy or an environmental management system, certified by an independent body for conformity to European or International Standards	− Companies that operate an energy management system certified to DIN EN ISO 50001 or an EMAS environmental management system − Public institutions and entities in which public authorities own a share and predominantly provide public services	Enterprises with an existing and certified system of energy management or environmental management can perform internal audit (based on standards STN ISO 50001, STN EN ISO 14001)	Enterprises that have already implemented audits within a certified energy or environmental management system that comply with the minimum criteria of the EED (i.e. certified according to international ISO standard, European EN standards, Swedish SS Standard or equivalent requirements).	Enterprises with an existing and certified system of energy management or environmental management (based on standards ČSN EN ISO 50001, ČSN EN ISO 14001)
▪ **additionalities**				
− Industrial systems with annual energy consumption exceeding 3 000 MWh − In case of major changes to the technological equipment or production systems, fuel switching and a change to the energy	no	− Electricity producers when constructing a new electricity facility or renewing an existing electricity facility with a certain minimum output − Heat producers over 10 MW output − All organisations that request public funding	Government and municipally controlled organisations and companies providing goods and services	− Physical and juridical persons with average annual energy consumption above 35 000 GJ (9 722 MWh) − State and county administration units and municipalities with total energy use above 1 500 GJ (417

Bulgaria	Germany	Slovakia	Sweden	Czech Republic
conversion method		for energy projects		MWh)/year
		▪ **fines for non-compliance**		
a fine in the scope of 10 000 to 30 000 BGN or an pecuniary penalty of 50 000 to 100 000 BGN	a fine up to EUR 50 000	a fine between 5 000 and 30 000 EUR	Fine not fixed, but calculated on the basis of company's total turnover, the degree of non-compliance and the economic situation of the company	- EUR 185 000 for not carrying out an audit - EUR 7 400 for not providing information about completed audit to the Ministry of Industry and Trade
Energy management				
The new EE Act introduces obligation to owners of large enterprises to implement EE management	Leading experience with energy management	Market for energy management services and training growing, capacities increasing.	Good experience with energy management	Efforts for introducing energy management system underway. The process and requirements are specified by ČSN EN ISO 50001
Requirements for energy auditors				
− Legal entities with the necessary technical equipment and staff − Specific requirements for staff about completed higher education and length of service in a relevant position − Certification scheme - qualification certificate after an exam − Registration in a public register by SEDA − Annual reporting to SEDA	− Specific requirements about expertise, acquired as a result of training or a professional qualification and practical experiences − No specific certification scheme is put in place − Directory of Energy Auditors kept by BAFA	− Specific requirements for minimum required education and length of service − Certification scheme managed by SIEA incl. training and exam − Certified auditors are registered by the Ministry of Economy and SIEA in a database of energy auditors − Update training of auditors minimum every 3 years.	− Certification is granted on the basis of education level and work experience − Certification granted upon completion of a test, including a written and practical part − The certification of energy auditors is valid for a period of five years	− Energy specialist qualification scheme is available - license is provided to specialists after passing an exam (oral and written) − Specific requirements for minimum required education and corresponding length of experience − Database of energy specialists
Possibility for internal auditors				
If not taken part in the design, building and/or operation, and implementation of energy saving measures in the industrial system	Internal auditors allowed if not directly involved in an activity that is subject to the energy audit	Internal auditors allowed if listed in the register, managed by the Ministry of Economy	Internal auditors allowed if not directly involved in the activity that is to be audited	Energy audits can be conducted by company's internal auditor, who undergoes training and exam by accredited institution

2 BRIEF OVERVIEW OF EU ENERGY EFFICIENCY DIRECTIVE (EED) 2012/27/EU

2.1 Objectives and expected results

The general nearest EU policy objective on energy efficiency is to save 20% of the EU's primary energy consumption, compared to projections for 2020. The Energy Efficiency Directive 2012/27/EU (EED) was adopted in 2012 with the objective to make a significant contribution to meeting the EU's 2020 energy efficiency target and to pave the way for further energy efficiency afterwards.

The Directive is based on the understanding that energy efficiency is the most cost-effective and fastest way to increase security of supply, and is an effective way to reduce the greenhouse gases emissions responsible for climate change. Energy efficiency also contributes to improving the competitiveness of industry, boosting economic growth and creating jobs.

2.2 Key provisions

The Energy Efficiency Directive provides a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. All Member States are required to use energy more efficiently at all stages of the energy chain: from production to final consumption.

Major requirement of the Directive is set in its Article 3: National energy efficiency targets. Accordingly, each Member State shall set an indicative national energy efficiency target, based on either primary or final energy consumption, primary or final energy savings, or energy intensity.

As ways to reach the targets, the EED includes key provisions for efficiency measures in both major areas: energy use and energy supply.

Efficiency measures in energy use include:

- Article 5: Exemplary role of public bodies' buildings – requirement for Member State to ensure for annual renovation of 3% of the total floor area of central government buildings to meet at least the minimum energy performance requirements
- Article 6: Purchasing by public bodies – provisions that central governments purchase only products, services and buildings with high energy-efficiency performance, as far as that is consistent with cost-effectiveness, economical feasibility, wider sustainability, technical suitability, as well as sufficient competition
- Article 7: Energy efficiency obligation schemes - requirement for Member State to set up an energy efficiency obligation scheme to ensure that energy distributors and retail energy sales companies are designated to achieving new savings each year of 1.5% of the annual energy sales to final customers
- Article 8: Energy audits and energy management systems - provisions that Member States shall promote the availability to all final customers of high quality energy audits which are cost-effective and carried out in an independent manner

- Articles 9-11: Metering; billing information; cost of access to metering and billing information – requirements for providing final energy customers with competitively priced individual meters, accurate and free of charge billing information based on actual consumption
- Article 14: Promotion of energy efficiency in heating and cooling – assessment of application of high-efficiency cogeneration and efficient district heating and cooling, cost-benefit analysis of cogeneration for new and to-be-renovated thermal electricity generation installations (more than 20 MW), cost-benefit analysis of waste heat use from nearby industrial installation for new and to-be-renovated district heating/cooling (for more than 20 MW installations), promotion of efficiency in district heating and cooling
- Article 15: Promotion of energy efficiency in energy transformation, transmission and distribution – inclusion the costs for energy efficiency in tariffs, identification of concrete energy efficiency measures in the network infrastructure, facilitate the connection of the electricity produced from co-generation to the grid, etc.

Horizontal EED provisions compile:

- availability of qualification, accreditation and certification schemes for providers of energy services, energy audits, energy managers and installers of energy-related building elements
- transparent and widely disseminated information on available energy efficiency mechanisms and financial and legal frameworks
- promotion for the energy services market and support for its proper functioning
- establishment of national financing facilities, or use of existing ones, for energy efficiency improvement measures.

EED provides for a Review and monitoring of implementation mechanism, including annual reporting and through the National Energy Efficiency Action Plans (NEEAPs).

2.3 Transposition by EU Member States – timeframe and its implementation

The Directive defines the final result to be achieved and the general requirements, while leaving sufficient flexibility to Member States to adapt implementation to their national specificities. However, Member States had to transpose the majority of EED provisions into national laws in a fixed timeframe by 5 June 2014. The deadline for affected organisations to comply with the directive was 5 December 2015.

The majority of Member States completed the EED transposition in 2014 and 2015, at that the majority of countries transposed the requirements with the delay. The wide scope of the Directive has been a challenge to many countries to keep the deadline for transposition into national legislation.

3 ARTICLE 8 OF EED ON ENERGY AUDITS AND ENERGY MANAGEMENT SYSTEMS

Article 8 of the Energy Efficiency Directive requires Member States to comply with the following obligations:

i) Promote the **availability of high quality and cost-effective energy audits to all final customers**. Audits should fulfil minimum criteria based on Annex VI of the Directive and carried out by qualified and/or accredited experts or supervised by independent authorities. The energy audits may be carried out by in-house experts or energy auditors provided that there is a scheme put in place to assure and check their quality.

ii) Establish transparent and non-discriminatory **minimum criteria for energy audits**, based on Annex VI of the Directive and referring to the quality of data used, level of detail, proportion and representativeness, inclusion of life-cycle cost analyses, and validity of calculations of potential savings.

iii) Establish in national legislation **requirements for energy auditors, and for supervision by national authorities**. Member States must encourage training programmes for the qualification of energy auditors to facilitate the availability of sufficient experts. This obligation is linked to Article 16 of the EED, as far as it requires availability of qualification, accreditation and certification schemes for providers of energy audits.

iv) Ensure the development of programmes to **encourage small and medium enterprises (SMEs) to undergo energy audits and to implement the recommendations** from these audits. These may include support schemes or voluntary agreements to cover costs of an energy audit and of the implementation of highly cost-effective recommendation from the audit, if the proposed measures are implemented. Concrete examples of how energy management systems could help SME businesses should be brought to the attention of SMEs.

v) Ensure **mandatory and regular audits for large enterprises** carried out in an independent and cost-effective manner. The first audit for such enterprises should be carried out between the date of EED entry into force (4 December 2012) and, at the latest, 5 December 2015. Further audits must be carried out in maximum four-year intervals. Large enterprises that implement energy or environmental management systems are exempt from the requirement of energy audits every four years, provided that the management system includes an energy audit meeting the minimum criteria.

vi) Ensure the development of programmes to **raise awareness among households** about the benefits of energy audits;

vii) Energy audits can stand alone or be **part of a broader environmental audit**, and Member States may require the audit to include an assessment of the technical and economic feasibility of connecting to an existing or planned district heating or cooling network

viii) Member States can implement **incentives or support schemes** for the implementation of audit recommendations, provided that these do not interfere with the EU State Aid Law.

As it can be seen from the listed provisions of Article 8, through this article the EED imposes two main obligations upon Member States:

- to promote the availability of energy audits among final customers in all sectors, and
- to ensure that large enterprises carry out regular energy audits.

While the obligation for large enterprises is new, the first one incorporates and builds upon the requirements of the Energy Services Directive (ESD) (2006/32/EU) for availability of efficient high-quality energy audit schemes, which are carried out in an independent manner, to all final consumers, including smaller domestic, commercial and small and medium-sized industrial customers (ESD Article 12). Respectively, these obligations of the Energy Services Directive refer to promoting the availability of energy audits to the housing and communal services sector and municipalities. This is supported by the requirements of Article 5 of the EED, saying that Member States shall encourage public bodies, including those at regional and local level, and social housing bodies governed by public law, to put in place an energy management system, including energy audits.

The audits under EED should cover the minimum criteria established on the basis of Annex VI of the Directive. As these criteria go beyond those required for energy performance certification of buildings under the Energy Performance of Buildings Directive (EPBD) (2010/31/EU), it should be understood that certification shall not be automatically regarded as equivalent to an energy audit as per the EED.

The scope of energy audits under the EED is wider than the certification of buildings under the EPBD. In particular, the focus of energy audits under the EED – even for buildings and households – goes beyond the technical characteristics of the buildings and includes e.g. all electricity uses and behavioural changes such as impact of occupant activity on energy consumption.[1]

However, as Commission Guidance advises, where it is relevant, synergies between the transposition and implementation of Article 8 of the Energy Efficiency Directive and of the implementation of the EPBD (in particular Articles 17 and 18), should be explored. Synergy should especially be sought as regards the national supervisory authorities set up under national legislation to make sure that energy audits are cost effective and carried out in an independent and cost-effective manner by qualified and/or accredited experts according to certain qualification criteria. Also, if the higher EED requirements for energy audits are used in building certification, the quality of audits associated with the EPBD will be improved.

It should be noted that the EED obligation for Member States to promote the availability of energy audits among final customers in all sectors does not impose a specific obligation to all final customers to carry out energy audits. Such obligation is imposed only on large enterprises. This is understandable, considering that large enterprises consume more energy than smaller customers, and thus have greater energy saving potentials.

[1] *Implementing the Energy Efficiency Directive – Commission Guidance*, European Commission, 6.11.2013

4 OVERVIEW OF IMPLEMENTATION OF ARTICLE 8 OF EED IN EU MEMBER STATES

4.1 Transposition into Member States national legislation

Most of the European Member States have transposed Article 8 into national legislation, although with some delays. However, the studies reviewed indicate different level of transposition and concretization of requirements across Member States.

Usually, the general set-up of the implementation of the EED, and the requirements of Article 8 specifically, are transposed into national legislation of Member States with a fundamental or primary document that deals with energy efficiency (Energy Efficiency Act or similar), e.g. Austria, Bulgaria, Czech Republic, Finland, Germany, Hungary, Romania, Slovenia. Some countries have adopted specific primary legislative document devoted to energy audits (France, Italy, Slovakia, and Sweden). Further implementation details are provided in additional documents which can be referred to as secondary documents. They include national legal documents as well as official guidelines[2].

4.2 Implementation for large enterprises

The obligations under Article 8 of EED for large enterprises to carry out regular energy audits as a new obligation, related to a wide range of affected organisations, has gained a substantive attention by the EU Commission, the Member States, the large enterprises and their associations. The guidelines and studies, developed to support the transposition of EED Article 8 greatly focus on issues related to audits in large enterprises.

4.3 Inclusions and Exemptions

An important issue relates to the definition of large company – it is defined as non-SMEs (and SMEs have concrete definition criteria). A SME, including a micro-enterprise, is defined as an enterprise that employs fewer than 250 persons and has an annual turnover of EUR 50 million or less, and/or an annual balance sheet total of EUR 43 million or less. Excepting households, all other entities, regardless of their legal form, engaging in economic activity that exceeds these thresholds, are considered large enterprises. These may include public institutions, facilities and enterprises.

The provisions of Article 8(4) do not exclude any sector (for example Emissions Trading Systems (ETS) sectors or Integrated Pollution Prevention and Control (IPPC) licence holders).[3] This means that companies qualified as large enterprises, which are participating in the Emissions Trading System or are licensed under IPPC should also do energy audits every 4 years in addition to their obligations related to these other systems.

However, some Member States used the possibility of exemptions and additional inclusions given by the EED to specify explicit criteria. In Bulgaria, energy audits are also mandatory for industrial

[2] *A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems, Report on the fulfillment of obligations upon large enterprises, the encouragement of small- and medium-sized companies and on good-practice, European Commission, April 2016*

[3] Implementing the Energy Efficiency Directive – Commission Guidance, European Commission, 6.11.2013, p.6/19

systems with annual energy consumption exceeding 3 000 MWh and outdoor lighting systems, located in towns with population exceeding 20 000 people.

Specific regulations exist in some countries as far as public institutions are concerned. Such is the case of Germany, which has decided to exempt public institutions. There are areas of economic activity that are also excluded from the obligation to conduct an energy audit due to their sovereign character, e.g. the fields of security, police and judiciary; public water supply, sewerage or waste disposal (as far as these activities are not performed by private third parties); activities of government-funded educational institutions (especially schools and kindergartens), etc. A recent EU study[4] reveals the same approach in Austria, Italy, and UK.

There are also possibilities for additional inclusion of public service organisations. In Sweden, after a national discussion specifically addressing the inclusion of municipalities under the obligations set on large enterprises, it was decided that the respective legislation would be also applicable to government and municipally controlled organisations and companies providing goods and services.

In Ireland, Public Service Organisations that either meet the definition of a large enterprise, or have either an individual building of more than 500 m^2 floor area or an annual energy spend of more than 35 000 EUR, have to comply with the obligation to conduct an energy audit.[4] In Slovak Republic the duty to perform energy audits rests with all organisations that request public funding for energy projects.

It is important to highlight that the EED does not impose obligations on large enterprises for implementing the measures prescribed by the energy audits.

Enterprises that are not SMEs and that are implementing energy or environmental management system, certified by an independent body according to the relevant European or International Standards, are exempted from mandatory audit, provided that Member States ensure that the management system concerned includes an energy audit on the basis of the minimum criteria.

In some countries the transposition acts only refer, in general terms, to European and international standards which have to apply to these management systems, others require certification according to concrete standards, like ISO 50001/EN 16001 for energy management or ISO 14001/EMAS for broader environmental management.

The exemption for companies that are implementing the ISO 50001 or ISO 140001 including an energy audit will be adopted in all countries. The International Standard ISO 50001 specifies energy management system (EnMS) requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use.

Deadlines for first audit

According to EED, the first audit for large enterprises should be carried out between the date of EED entry into force (4 December 2012) and, at the latest, 5 December 2015. Considering that most Member States completed the EED transposition in 2014 and 2015, there was very little time left for

[4] A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems, Report on the fulfillment of obligations upon large enterprises, the encouragement of small- and medium-sized companies and on good-practice, European Commission, April 2016

companies to make the necessary steps and complete their first audits within the deadline in order to comply with the provisions of the Directive.

In some countries, it has been reported that companies found it challenging to identify an auditor as a result of a high short-term demand for energy audits. In some cases this was also claimed to lead to an increase in prices, and in a reduction in the quality of the audits.[5]

To mitigate this negative effect, some countries have introduced extended deadline in their national legislation, or applied a flexible approach.

In Bulgaria, the deadline for the first audit of large enterprises was defined as one year after the national transposition law entered into force. In the Czech Republic additional time until 2016 was given to companies. Germany provided a compromise date (01.01.2017) for companies implementing a management system.

A special three steps process to enable enterprises to conduct their first energy audit was introduced in Sweden. The first step was for companies to submit a report by 5 December 2015 to provide information on whether or not the company is affected by the law, to inform about their activities covered by the Act and the parts of the business to be energy-audited. The second reporting will be in the beginning of 2017.

Non-compliance penalties

Because the transposition of Article 8 requires Member States to impose obligations on third parties, Member States are required to lay down rules on penalties applicable in case of noncompliance with the national provisions. According to Commission Guidance on implementing the EED, these penalties must be 'effective, proportionate and dissuasive' and must be notified to the Commission within 18 months of the coming into force of the Directive.

Generally the imposition of a financial penalty for non-compliance is an appropriate sanction in order to ensure compliance with the obligation. To be effective, a penalty for non-compliance needs to exceed the costs of actually conducting an energy audit. Thus the penalty has to be sufficiently high to induce action.[5]

Regarding non-compliance penalties, each country defined a specific system depending on the national road map.

Penalties directly on the enterprise vary considerably, ranging from EUR 10 000 in Austria to EUR 200 000 in Romania.[5] The Czech Republic has second highest level of penalty at EUR 185 000. However, the common case is of penalties between EUR 30 000 (as in Bulgaria and Slovakia) and 50 000 (as in Germany).

Denmark, Finland, France, Netherlands and Sweden have not defined any specific penalty, and intend to decide this on a case-by-case basis. In Sweden the fine is calculated on the basis of company's total turnover, the degree of non-compliance and the economic situation of the company. Company turnover is considered in defining the penalty in Spain as well.

[5] A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems, Report on the fulfillment of obligations upon large enterprises, the encouragement of small- and medium-sized companies and on good-practice, European Commission, April 2016

4.4 Minimum criteria for energy audits

For the purpose of guaranteeing the high quality of the energy audit and energy management systems, Member States must establish transparent and non-discriminatory minimum criteria for energy audits based on Annex VI of EED. The minimum criteria in Annex VI include guidelines on the data to be used, the depth and scope of the audit, the recommended cost analysis and the quality requirements in terms of representativeness of the energy audits.

The standard EN 16247 covers the general requirements common to all energy audits. This standard specifies the requirements, common methodology and deliverables for energy audits. It applies to all forms of establishments, all forms of energy and uses of energy (buildings, process and transport), excluding individual private dwellings. It is expected that this standard will be selected as a structured and harmonized methodology in most of the European countries. [6]

However, the requirement for standard EN 16247 to be met is clearly set only in Germany and France. In Sweden, the mandatory energy audits of large enterprises shall be conducted in accordance with international ISO standards (for example ISO 50002 Energy audits — Requirements with guidance for use), European EN standard, or Swedish SS standard.

Most of the Member States have transposed the guidelines for energy audits as outlined in Annex VI. However, there are still some countries which have not come up with updated regulations for energy audits to reflect the requirements of Annex VI of EED (e.g. Bulgaria).

Annex VI (d) states that energy audits must be sufficiently representative to permit the drawing of a reliable picture of overall energy performance and the reliable identification of the most significant opportunities of improvement. Therefore, national minimum criteria based on Annex VI must make clear that all energy related aspects - buildings or groups of buildings, industrial operations or installations, including transportation - must be systematically screened. On the basis of this, the scope and extent of activities or facilities addressed of each energy audit and the degree of thoroughness needed for drawing up the required reliable assessment are to be defined on a case by case basis.

Considering this guidance on representativeness, some Member States have defined lower than 100% minimum percentages of the total energy consumption of the company that have to be covered by the energy audits. In Germany, the energy audit is in any case assumed to be representative, if at least 90% of the company's total energy consumption are included in the energy audit. Similar are the cases of the UK (90%) and Finland (95%). Some other Member States directly follow the general wording in Annex VI of the EED and define in their national legislation that the energy audit has to cover all essential areas of energy consumption and at the same time has to be sufficiently proportionate and representative. This therefore leaves room for interpretation by energy auditors, enterprises and enforcement authorities.

[6] C. Laur, J.-L. Harnet, European directive2012/27/EU: Transposition of article 8 related to mandatory energy audit, Beelas Group, January 2015

4.5 Requirements for energy auditors

EED requires energy audit to be carried out in an independent and cost-effective manner by qualified and/or accredited experts or implemented and supervised by independent authorities.

Respectively, most European countries introduced specific requirements about expertise, acquired as a result of training or a professional qualification and practical experiences for energy auditors. Certification schemes are introduced in some countries, under which certification for auditors is granted after training and an exam (Bulgaria, Slovakia) or only an exam (Sweden, Czech Republic). Certificates might be with limited validity of several years (e.g. 5 years in Sweden, update training every 3 years in Slovakia).

General approach describing needed energy auditors skills is also given in the current European standard EN 16247-5 Energy audits - Part 5: Competence of energy auditors from May 2015.

Publicly available databases or directories of certified auditors are established in some countries (Bulgaria, Germany, Slovakia, Czech Republic). Information is managed by assigned public institutions, usually the ministry or agency responsible for supervising the implementation of EED.

Under the EED, energy audits may be conducted by a company's internal specialists, provided that the quality of auditing is efficiently controlled. Most countries allow internal experts to do energy audits, but only if certified as auditors and not directly involved in an activity that is subject to the energy audit. The decision on this issue was different in the Czech national legislation at the beginning, where energy audits could not be conducted by a company's internal specialists in order to safeguard independence.

4.6 Energy Management

Article 8 of EED provides exemptions to the obligation for large enterprises to carry out regular energy audits, when those enterprises are implementing an energy or environmental management system 'certified by an independent body according to the relevant European or International Standards'. The exemption from the audit obligation for large enterprises refers specifically to formalised energy management systems complying with relevant European and International Standards.

All Member States have included this exemption in their national regulations concerning mandatory energy audits in large enterprises.

An impetus to introducing energy management systems in industry was given in 2011 when the International Organization for Standardization (ISO) launched the ISO 50001 Standard. This international standard is based on the Plan - Do - Check - Act (PDCA) continual improvement framework and incorporates energy management into everyday organizational practices. In the context of energy management, the PDCA approach can be outlined as follows:

- Plan: conduct the energy review and establish the baseline, energy performance indicators (EnPIs), objectives, targets and action plans necessary to deliver results that will improve energy performance in accordance with the organization's energy policy;
- Do: implement the energy management action plans;

- Check: monitor and measure processes and the key characteristics of operations that determine energy performance against the energy policy and objectives, and report the results;
- Act: take actions to continually improve energy performance and the EnMS.

The adoption of this energy management approach by companies varies considerably across the 28 EU Member States. In 2014, the ISO registered a total of 5 267 valid certificates across the EU-28. The majority of these (3 204 certificates) have been registered in Germany.[7] At the same time, only 12 ISO 50001 certificates were issued in Slovakia, the same number in Bulgaria, 32 certificates in the Czech Republic.[8]

4.7 Instruments used for SMEs

The EED has several measures that are intended to support energy savings in SMEs. These include requiring Member States to:

- develop programmes to encourage SMEs to undergo energy audits and the subsequent implementation of the recommendations from these audits
- set up support schemes for SMEs, including if they have concluded voluntary agreements, to cover costs of an energy audit and of the implementation of highly cost-effective recommendations from the energy audits, if the proposed measures are implemented.
- bring to the attention of SMEs, including through their respective representative intermediary organisations, concrete examples of how energy management systems could help their businesses.
- encourage training programmes for the qualification of energy auditors in order to facilitate sufficient availability of experts.

All these measures are laudable but they are mostly quite open-ended with respect to how they are defined, implemented and with respect to their scale of implementation. As the nature and scale of requirements is left unspecified Member States have considerable freedom to do rather little in this domain while still technically meeting the legal obligations i.e. of having done something, no matter how modest. Inspection of the activities mentioned in national energy efficiency action plans reveals that many are exercising this freedom.[9]

In general, few programmes have been developed specifically to help SMEs to undergo energy audit, although some countries have included legal self-commitments into their transposition acts (e.g. Bulgaria, Slovakia). These countries have to introduce such specific support schemes for SMEs by law, but no deadline for this is set.

However, public support for energy efficiency measures and even for energy audits in SMEs exists, although not initiated in relation to EED requirements, but receiving a new impetus by the Directive.

---

[7] A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems, Report on the fulfillment of obligations upon large enterprises, the encouragement of small- and medium-sized companies and on good-practice, European Commission, April 2016

[8] ISO Survey, www.iso.org

[9] Paul Waide, The Scope for Energy Savings from Energy Management, 2016

The Operational Programmes funded by the European funds in Bulgaria, Slovakia and the Czech Republic are structured in a way to provide grants, soft loans or guarantees for energy efficiency projects in SMEs. A successful financing mechanism for energy efficiency projects in enterprises and municipalities proved to be the Bulgarian Energy Efficiency and Renewable sources Fund.

A good example of a subsidy support for SMEs is the German programme 'Energy Consulting for SMEs', which provides funds for energy consulting in SMEs that meet the requirements of energy audits according to the EU Energy Efficiency Directive. In Sweden, an energy audit support scheme for SMEs is existing since 2010, and was modified to provide support for implementation of Article 8 of EED. The support is provided in the form of what are known as energy audit checks.

Information instruments are intended to provide information on the energy demand of entities and on opportunities to improve their energy efficiency. Examples of this type of instrument are the energy efficiency networks applied in Germany and in Sweden where companies exchange their experiences regarding energy efficiency. Education, information and communication activities are the Instruments used in the German SME Initiative for Energy Reforms and Climate Protection, operated by the Federal government and some business associations.

It can be noted, that a success factor for support programmes to SMEs is when national governments involve representative intermediary organisations in awareness raising actions for promoting energy audits and management systems in the EU.

4.8 Programmes to raise awareness among households

Article 8 of the Energy Efficiency Directive requires Member States to ensure the development of programmes to raise awareness among households about the benefits of energy audits. This aspect of the Directive has not gained specific attention so far. One reason might be that there was a number of energy efficiency programmes directed to households already existing. Although they were not specifically and explicitly focused on audits, they incorporated dissemination of information, awareness raising, advice and financial support for energy efficiency in the residential sector. In their reports on the implementation of the EED Member States refer to these on-going activities.

In the general case, national agencies dealing with energy efficiency are responsible and active in awareness raising activities for different target groups, including households. There are a number of good practices of governmental support for awareness raising and advice. Worth mentioning are the consulting and advisory services provided to households in Germany by 670 consumer centres nationwide. Advice centres have been set up in Slovakia as well. Energy advisors in all 290 Swedish municipalities also provide advice and guidance on energy efficiency, energy use and climate impact.

The large number of investment projects with public funding support in Member States has also demonstrated the objectives and results of energy audits to the general public. Good examples can be the Czech programme 'Green Savings' and the Bulgarian National Energy Efficiency Programme for Multi-Family Residential Buildings.

5 REVIEW OF THE IMPLEMENTATION PRACTICES OF ARTICLE 8 OF EED IN SELECTED COUNTRIES

This section presents the experience of five EU member States with the transposition of Article 8 of the EU Energy Efficiency Directive. The related legislation, practical steps and activities for introduction of energy audits and energy management as required by Article 8 are reviewed in Bulgaria, Germany, Slovakia, Sweden and the Czech Republic. The cases of these countries were selected, as they provide good examples of relevant policy instruments to ensure the implementation of the requirements of the EED regarding energy auditing and energy management. Some of their approaches were already mentioned as examples in Section 4. Here the country packages of legislation and practice for implementation of mandatory energy audits for large enterprises, minimum criteria for energy audits, requirements for energy auditors, energy management, and instruments for stimulating SMEs and raising awareness among households are presented.

The review is done on the basis of publicly available information sources, mainly disseminated by the EU Commission, official documents and reports of the governmental institutions of the selected countries (see references).

5.1 Bulgaria

Legislation

Bulgaria adopted a new Energy Efficiency Act (EEA), in force since 15.05.2015, with which the state fully transposed the requirements of Article 8 of EED.

Previous Energy Efficiency Act of 2004, amended several times, latest in 2014, already introduced obligations for industrial systems with annual energy consumption above 3,000 MWh to undergo mandatory energy audits every 5 years. In relation to these obligations Ordinance No. 16-RD-346 of 2 April 2009 on the indicators for energy consumption, energy performance of industrial systems, the terms and conditions for carrying out energy audits of industrial systems was adopted. This Ordinance is still applicable, but it should be subject to amendment to cover all requirements of the EED Annex VI.

The Energy Efficiency Act of 2004-2014 also introduced requirements for certification of energy auditors, further specified in Ordinance No 16-RD-301 of 10.03.2014 on the circumstances subject to entry in the registers of persons carrying out certification of buildings and energy audits of industrial systems, procedures for obtaining information from the registry, the terms and conditions for the acquisition of qualifications and the necessary technical means for carrying out the auditing and certification activities. This Ordinance is still applicable as well.

New secondary legislative acts were adopted concerning other aspects of EED. Ordinance No. E-RD-04-3 of 4.05.2016 provides further details for eligible measures for energy savings in end-use, the means of proof of the achieved energy savings, requirements for the methodologies for their evaluation and the ways of their verification, related to energy traders and their obligations. It specifies the requirement for carrying out energy audit of buildings, enterprises and industrial systems to prove the achieved energy savings on the demand side when reporting the fulfilment of the individual annual targets of energy traders.

Two other new ordinances, issues in 2016, specify the requirements to energy efficiency audits, certification of buildings, and indicators for the energy performance of buildings.

Responsible authorities for the implementation of the provisions of the EEA related to Article 8 are the Ministry of Energy, the Ministry of Economy, and the Sustainable Energy Development Agency (SEDA). SEDA is the supervising national authority concerning audits, auditors and energy management of buildings, enterprises, industrial systems and outdoor lighting systems.

Implementation for large enterprises

Bulgarian Energy Efficiency Act defines large enterprises as non-SMEs, as in the EED. Bulgarian legislation has adopted the EU definition for SMEs as enterprises employing less than 250 persons and annual turnover of less than 97,5 million leva (~50 million EUR [10]), and/or value of assets less than 84 million leva (~43 million EUR).

Subject to mandatory energy efficiency audits are enterprises in the production and services sectors that are not SMEs. Additionally, energy audits are mandatory for industrial systems with annual energy consumption exceeding 3 000 MWh and outdoor lighting systems, located in towns with population exceeding 20 000. The audits shall be performed at least every four years. When industrial systems are undergoing major changes to the technological equipment or production systems, fuel switching and a change to the energy conversion method, a new audit shall be mandatorily performed one year after these changes.

These requirements are building upon regulations introduced in 2013 with the previous EE Act, which defined individual energy saving targets to the owners of industrial systems with annual energy consumption of over 3 000 MWh. Such industrial systems were also subject to mandatory energy audits every 5 years, and were also obliged to implement prescribed measures to ensure the level of their individual energy saving targets to be met by 2016.

The list of obliged parties and the individual energy savings targets they were to achieve have been approved by the Council of Ministers and were set out in an annex to the National Energy Efficiency Action Plan 2014-2020. The new Energy Efficiency Act, adopted in 2015, confirmed the obligation of implementing the individual energy savings targets by 2016 as allocated by the repealed Act.

In total, 297 companies - owners of industrial systems had individual energy saving targets and approximately 84% of them have conducted energy efficiency audits. The largest number of the companies operates in the food production sector (63) and the metal manufacturing sector (60). A significant number of industrial systems owners with individual energy savings targets (38) operate in the services sector. This is mostly due to the fact that the list includes the water supply and sewerage utilities in larger towns.[11]

The new Energy Efficiency Act sets the deadline for the obliged owners of enterprises, industrial systems and outdoor lighting systems for completing the mandatory audit at one year from the entry into force of the Act, i.e. until 15 May 2016, unless a mandatory audit according to the old Energy Efficiency Act had been performed until that date.

[10] *Bulgarian lev (BGN) has a fixed exchange rate to Euro of 1.95583 BGN/EUR*

[11] *Annual report on the implementation of the National Energy Efficiency Action Plan 2014–2020, Republic of Bulgaria, Ministry of Energy, March 2016*

In implementation of this measure, 58 industrial systems were audited in 2015. The expected annual savings from the implementation of the energy efficiency measures prescribed in the energy audit reports amount to 21,7 GWh energy, 11,2 thousand tones CO_2 and 9,1 million Bulgarian leva.[12]

Any owner of an enterprise, industrial system and outdoor lighting system, who fails to fulfil the obligations concerning mandatory energy audits, shall be liable to a fine in the scope of 10 000 to 30 000 BGN or to an administrative penalty of 50 000 to 100 000 BGN.

The owners of enterprises and industrial system are not bound to implementing the prescribed energy efficiency measures by the audit. However, the Energy Efficiency Act includes a provision for the Minister of Economy to propose schemes to encourage the implementation of energy efficiency measures in industrial systems. Such schemes are mainly expected on the basis of the funding by the EU Operational Programmes.

Under the Operational Programme Development of the Competitiveness of the Bulgarian Economy, funding was available for industrial projects for the introduction of energy saving technologies and RES. The main goal was to provide investment support to large enterprises in Bulgaria with the intention of increasing their competitiveness and sustainable development, including by encouraging the implementation of projects for reducing energy intensity.

Under a grant scheme procedure 'Green industry investments', launched in 2011 under this programme, a total of 30 grant agreements with a total value of 77 million BGN have been concluded. In 2015, implementation under 5 agreements was completed, with disbursement of grant funds (public financial support) in the amount of about 15 million BGN. The total project amount contracted is about BGN 30 million, with expected energy savings of 25 268 MWh/year.[13]

Energy Management

In line with the provisions of the EED, the Bulgarian Energy Efficiency Act exempts enterprises and industrial systems, which implement an energy or an environmental management system, certified by an independent body for conformity to European or International Standards, from the requirements for mandatory energy efficiency audit, provided that the applied management system includes an energy audit. The law does not specify the standards to be covered.

The Energy Efficiency Act treats energy management in general in a special section. According to its provisions, the owners of buildings, the owners of enterprises, industrial systems and outdoor lighting systems subject to mandatory energy efficiency audit are bound to implement energy efficiency management by means of:

- organizing the implementation of the energy efficiency programmes of state bodies and local authorities, as well as other measures;
- maintaining databases on the monthly production/demand by types of energy and customers, including dates, prices, amount and quality of the energy and fuels supplied/sold;

[12] *Annual report on the implementation of the National Energy Efficiency Action Plan 2014–2020, Republic of Bulgaria, Ministry of Energy, March 2016*

[13] *Annual report on the implementation of the National Energy Efficiency Action Plan 2014–2020*, Republic of Bulgaria, Ministry of Energy, March 2016

- preparing annually energy demand analyses.

The obligation of implementing energy efficiency management is aimed to facilitate the implementation of the energy efficiency improvement measures prescribed as a result of the audits.

The obligated persons have to submit annual reports on energy efficiency management to the Sustainable Energy Development Agency (SEDA) not later than the 1st day of March of the year following the reporting year. The annual reports are to be prepared using a model template approved by the SEDA Executive Director. It was reported that SEDA has received 223 energy efficiency management reports from enterprises and industrial systems.

Some project activities carried out in the context of the requirements of the previous Energy Efficiency Act are in good support for the implementation of the new obligations of large enterprises concerning energy management. As an example, part of a project on enhancing SEDA institutional capacity financed under Operational Programme Development of the Competitiveness of the Bulgarian Economy, directly targeted the energy managers of large enterprises. A manual on energy efficiency management at enterprises has been developed within the framework of the project. The manual has been compiled in line with the best European and global practices and contains information on current European energy management standards, including BDS EN ISO 50001. As part of the project, specialist training events on energy efficiency management at enterprises, including training in BDS EN ISO 50001, were delivered in 2015. In 21 training sessions, 340 energy managers at industrial enterprises across the country were trained.

Minimum criteria for energy audits

As it was mentioned, a secondary legislative document, Ordinance No. 16-RD-346 was introduced in 2009 to guide the implementation of the obligations of industrial systems with annual energy consumption above 3 000 MWh to undergo mandatory energy audits as required by the previous Energy Efficiency Act. The Ordinance included steps and scope of the energy efficiency audit, indicators for energy consumption, energy performance of industrial systems, the terms and conditions for carrying out energy audits of industrial systems. This Ordinance is still applicable.

However, this Ordinance does not reflect the requirements of the EED as in Annex VI. The new Energy Efficiency Act of 2015 includes obligation for issuing a new ordinance by the Minister of Energy and the Minister of Regional Development and Public Works. It should determine the indicators of energy expenditure, the energy performance of enterprises, industrial systems and outdoor lighting systems, as well as the terms and procedure for performing an energy efficiency audit and preparing an energy savings evaluation. This document is still not in place.

Requirements for energy auditors

Bulgarian Energy Efficiency Act defines strict requirements to energy auditors of enterprises, industrial systems and outdoor lighting systems in a special article of the Act. A similar article is included for energy auditors of buildings. In fact, the only difference in requirements is concerning the specific type of attained qualification, proved with a certificate. The requirements are further specified in Ordinance No 16-RD-301 of 10.03.2014 mentioned earlier.

The energy auditors have to be registered as a legal entity (referred to as ‘traders’ under the Bulgarian law); to have at their disposal the necessary technical equipment for performing energy

audits; and to have the necessary staff of energy efficiency consultants who meet the requirements specified in the law:

- have completed higher education in the field of technical sciences in the specific professional field and specialties
- have acquired a length of service in a relevant position - not less than 2 years for Master degree, 3 years for Bachelors, and 6 years for persons who have completed secondary technical education
- hold a certificate on a successfully passed examination for the attainment of the qualification necessary to perform energy efficiency audits of industrial systems at higher technical schools specialized in the professional fields of Energy, Electrical Engineering, and Architecture, Civil Engineering and Geodesy.

The auditors have to apply for registration in a public register, managed by SEDA and published on its website. The Agency issues certificates to the persons entered in the register in consideration of payment of a fixed fee of 60 BGN (about 30 EUR). The term of validity of the certificate of entry into the register is five years. So far, 49 companies are included in the registry as auditors of enterprises, industrial systems and outdoor lighting systems. (The list of companies of energy auditors of buildings is much longer and contains 305 companies.)

It is also required that annually, not later than the 31st January, the energy auditors shall submit to the Agency a list of the enterprises, industrial systems and outdoor lighting systems of which they have performed an audit during the previous year.

Registered auditors, who have taken part in the design, building and/or operation, and implementation of energy saving measures in the industrial system, do not have the right to perform an energy efficiency audit of this same industrial system.

Instruments used for SMEs

According to the Energy Efficiency Act small and medium-sized enterprises are obliged to carry out mandatory energy audits in two cases:

1. when they have industrial systems with energy consumption above 3 000 MWh, they fall under the requirements for large enterprises,
2. if they own public-services buildings with floor area over 250 square metres, their buildings shall be subject to mandatory audit and certification.

Specific programmes directed to SMEs for encouraging them to undergo energy audits and to implement the recommendations from these audits are not defined in the Energy Efficiency Act. According to its Article 8, the Minister of Economy is obliged to propose schemes to encourage the conduct of energy audits of small and medium-sized enterprises, as well as the application of the measures recommended by these audits. Such specific schemes are still not adopted.

However, the Energy Efficiency Act includes provisions for schemes and mechanisms that may be applied to encourage energy efficiency in final energy consumers. These schemes and mechanisms include:

- energy performance contracts (EPC) in buildings, enterprises, industrial systems and outdoor lighting systems, which may be concluded after an energy efficiency audit has been performed
- energy savings certificates – for energy traders with individual energy savings targets
- financing from the Energy Efficiency and Renewable Sources Fund or from other financial intermediaries
- other national or European support schemes and mechanisms.

These energy efficiency promotion schemes and mechanisms shall be developed and applied in compliance with State aid requirements.

The scheme of energy performance contracts, although well known, is not widely used in Bulgaria. The market of ESCO services is limited and most ESCO projects are mainly implemented in the public sector, although several international projects provided support for the development of the ESCO market in the country by funding support (EBRD) and by capacity building (EU funded projects).

The Energy Efficiency and Renewable Sources Fund also applies a scheme to support ESCO, but its major objective is financing energy efficiency investment projects.

The Energy Efficiency and Renewable Sources Fund is a revolving mechanism for development and financing of commercially viable projects and capacity building. The Fund has the combined capacity of a lending institution, a credit guarantee facility and a consulting company. It provides technical assistance to Bulgarian enterprises, municipalities and private individuals in developing energy efficiency investment projects and then assists their financing, co-financing or plays the role of guarantor in front of other financing institutions.

A necessary pre-condition for a successful application with the Bulgarian Energy Efficiency Fund is the presence of a detailed energy audit allowing for an energy analysis and the choice of energy-saving measures.

The Fund provides three main categories of financial products to Bulgarian companies, municipalities and private individuals:

- loans below market interest rates to energy efficiency projects with cost between 30 000 BGN and 3 million BGN,
- partial credit guarantees: up to 80% of the amount of approved bank loan for projects,
- portfolio guarantees (ESCO portfolio guarantee and Residential portfolio guarantee): up to 5% of portfolio.

The financial resources of the Energy Efficiency and Renewable Sources Fund are being used to finance the following type of investments:

- investments in improved energy efficiency in industrial processes
- rehabilitation of buildings in all sectors,
- improvements to the heat source and distribution system,
- other energy end-use applications, including energy management control systems.

The Bulgarian Energy Efficiency and Renewable Sources Fund is considered one of the very successful funds and involves a variety of financial sources, including the private sector.

Financial support to small and medium-sized enterprises for the introduction of energy saving technologies and RES was provided under the Operational Programme 'Development of the Competitiveness of Bulgarian Economy' 2007 - 2013. The Competitiveness Operational Programme is co-financed by the European Union from the European Regional Development Fund.

Under the grant scheme 'Energy efficiency and green economy', launched in the middle of 2012, 456 grant agreements with a total value of about 286,4 million BGN have been concluded.[14]

The main goal of the grant scheme was to provide integrated investment and consultancy assistance to micro, small and medium-sized enterprises in Bulgaria with a view to enabling the transition to a green economy by encouraging the implementation of projects directly linked to the use of energy-saving technologies aimed at reducing the energy intensity of manufacturing, and the introduction of renewable energy sources, as well as the implementation of measures that improve processes and energy management, thereby contributing to sustainable environmental development and lowering negative environmental impacts.

The current Operational Programme 'Innovation and Competitiveness' 2014-2020 includes a grant scheme 'Energy Efficiency in SMEs', open in 2016 with a budget of EUR 90 million. The scheme provides grant support for the introduction of energy-saving technologies, improvement of the energy performance of production buildings and the use of renewable energy sources for own use. The eligible activities include energy audits and introduction and certification of energy management systems according to the requirements of BDS EN ISO 50001. Information campaign is organized around the country to promote the grant scheme, to present the procedures and to support SMEs' participation.

Programmes to raise awareness among households

In the context of Article 8 of the Energy Efficiency Directive, Member states have to ensure the development of programmes to raise awareness among households about the benefits of energy audits. Specific programmes to cover this requirement are not in place so far. However, energy auditing of buildings has been introduced as a regulated practice in Bulgaria since 2004. A number of investment and capacity building projects have demonstrated the objectives and results of energy audits to the experts and the general public.

The on-going National Energy Efficiency Programme for Multi-Family Residential Buildings, adopted by the Council of Ministers on 27 January 2015, is playing an important role for raising awareness among households about the benefits of energy efficiency and the importance of energy audits. The main focus of the Programme is the renovation of multi-unit residential buildings through the implementation of energy efficiency measures, thereby improving the housing conditions, heat comfort and living conditions for citizens. Under the programme, grant assistance is available to registered associations of home owners in all 265 municipalities in Bulgaria. Technical expertise of

[14] Annual report on the implementation of the National Energy Efficiency Action Plan 2014–2020, Republic of Bulgaria, Ministry of Energy, March 2016

the buildings and energy audits are mandatory first steps in the application process, and are 100% subsidized.

The Ministry of Regional Development and Public Works, which is the responsible governmental body for the Programme, has developed a package of documents, including methodological guidelines for the municipalities and associations of home owners and the model application package. An active and wide information campaign is disseminating information about all aspects of the Programme and the benefits expected for home owners. Although the Programme is advancing slower than expected 1 731 financing agreements were signed in 2015.

5.2 Germany

Legislation

Article 8 of the Directive on Energy Efficiency has been fully implemented by amendment of the Act on Energy Services and Energy Efficiency Measures (EDL-G) of 2010, which was adopted by the German Parliament in April 2015. Key provisions of the amended EDL-G referred to the introduction of mandatory energy audits for non-SMEs.

Interpretation Guideline of the Federal Office of Economics and Export Control (BAFA) was published in July 2015[15]. These guidelines are aimed at simplifying the application of the Law for companies.

The National Action Plan on Energy Efficiency of Germany (*NEEAPdBD*), adopted by the Federal Government in December 2014, is a policy document, which sets out measures also designed to help the implementation of the EU Energy Efficiency Directive. *NEEAPdBD* is a comprehensive energy efficiency strategy grouping together the objectives, a large number of new measures for immediate action and working methods, details of financing and the responsibilities of each stakeholder. *NEEAPdBD* provisions upgraded existing instruments and introduced new ones for providing support to the industry sector, including mandatory audits for large companies, 500 Energy Efficiency Networks, support for waste heat utilisation, funding schemes for energy efficiency measures, and funding schemes for energy audits. The amendment of the Act on Energy Services and Energy Efficiency Measures (EDL-G) in 2015 is also part of the National Action Plan for Energy Efficiency of Germany (*NEEAPdBD*).

For the building sector, amendment of the German Energy Saving Ordinance (EnEV 2014), passed by the Federal government in October 2014 sets minimum requirements for the quality of energy performance in the envelopes and technical installations of new buildings and larger-scale renovations of existing buildings.

The German government is implementing the EED under the guidance of the Federal Ministry for Economic Affairs and Energy (BMWi). The Federal Office for Energy Efficiency (BfEE), which was established in January 2009 at the Federal Office of Economics and Export Control (BAFA), monitors the market for energy services and other energy efficiency improvement measures. The Office also keeps a record on providers of such services, thus creating more transparency for end-customers.

[15] Guidelines for Energy Audits in accordance with the statutory provisions of §§ 8 ff. EDL-G, Federal Office for Economic Affairs and Export Control, 2015

Implementation for large enterprises

The 2015 Amendment of the Act on Energy Services and Energy Efficiency Measures (EDL-G) introduces a new obligation for mandatory implementation of energy audits in large companies. The obliged companies are defined as non-SME as in the EED and include companies with economic activity and 250 or more employees or less than 250 employees, but more than EUR 50m turnover and EUR 43m balance sheet. Companies acquire or lose their non-SME status if they exceed or fall below the threshold for two consecutive years.

The provisions of EDL-G apply to businesses from all areas – from manufacturing and production through trading companies and the financial sector up to health providers. Approximately 50,000 companies are affected by the scheme. The Federal Ministry for Economic Affairs and Energy (BMWi) created an online-based "test scheme for classification as small or medium sized enterprises", which can help companies to verify whether they fall under the mandatory audit obligations or not.

Only a few sectors fall outside the scope of application of mandatory audits because of their public authority characteristics, and this refers to public institutions and entities in which public authorities own a share. Whether an institution or entity is considered to be part of public administration depends not on the (private or public) legal nature of the institution or entity, but on the services it provides or activities it undertakes. The decisive element is to what extent it pursues an economic activity.

So, municipal administrations and entities which predominantly provide public services are not required to perform energy audits, e.g. activities in the fields of security, police and the justice system; public water supply, sewerage or waste disposal (as far as these tasks are not performed by private third parties); publicly-funded educational institutions (especially schools and kindergartens), etc. If an institution performs both economic activities and public functions, the regulation is applied depending on which of the activities is predominant.

Another exemption from the obligation to conduct mandatory energy audits refers to companies that operate an energy management system certified to DIN EN ISO 50001 or an EMAS environmental management system.

Qualifying companies had to undertake energy audits by 5 December 2015 and repeat it at least every four years. The deadline set by the regulation for the first audits within 7 months was very tight. If the company implemented a management system, it only had to prove the initiation of the system's implementation. A respective certificate only has to be submitted as of 01.01.2017.

Sanctions for non-compliance apply if a qualifying company has not undertaken the mandatory energy audit, has not undertaken it properly or completely, or has not undertaken it on time. Such cases may entail a fine of up to EUR 50,000. No information was found as to how the first deadline was kept by obliged companies.

Minimum criteria for energy audits

The criteria for energy audits are set with the Act on Energy Services and Energy Efficiency Measures (EDL-G), and further specified/clarified with the Guidelines for Energy Audits. They cover all requirements of Annex VI of the Energy Efficiency Directive.

According to EDL-G, the audits the large enterprises (non-SMEs) are obliged to carry out regularly, should comply with the particular requirements of Standard DIN EN 16247-1. According to DIN EN 16247-1, an energy audit is a systematic inspection and analysis of the energy use and consumption of a plant, building, system or organisation, with the aim of identifying and reporting on energy flows and the potential for energy efficiency improvements. Also, the company should provide a person in charge or a contact person for coordinating the performance of the energy audit.

Respectively, EDL-G provides that the energy audit must include a thorough examination of the energy consumption profile of buildings or groups of buildings and of industrial operations or facilities including transportation. The energy audit must be based on up-to-date, continually or periodically measured, verifiable operational data relating to energy consumption and load profiles.

Additionally, EDL-G provides that the energy audit must be sufficiently proportionate and representative, so as to provide a reliable overview of total energy efficiency and reliably derive the most important possible improvements.

The energy audit is in any case assumed to be representative, if at least 90% of the company's total energy consumption are included in the energy audit. The total energy consumption is defined as the amount of energy used and consumed by the company itself, over the relevant period in the entire company. All sources of energy are to be taken into account and all plants, sites, processes, facilities and transportation of the company must be recorded.

The energy audit is to be considered proportionate, if it is limited to the calculation of total energy consumption of plants, sites, processes, facilities and transportation of the company in Germany, which therefore fall under the scope of application of the EDL-G.

In the case of buildings, energy consumption is in principle to be taken into account in the energy audit for those spaces of the building which the company uses for business purposes. When the buildings are rented or leased, and the company has no direct influence on the energy consumption, these buildings can be excluded from an energy audit. This is because constructors and owners are subject to the regulations of the Energy Saving Ordinance (EnEV), which records energy consumption as well as the potential for saving energy in a way similar to an energy audit.

The data used in the audits for determining the total energy consumption should be verifiable. This especially includes invoices, delivery notes, accounting records and meter readings, as well as possibly load profiles provided by the supplier. However, energy expenses cannot be used as a basis for determining energy consumption.

Where possible, the economic efficiency calculations for the energy efficiency measures developed during the energy audit should be based on a life-cycle cost analysis. Various tools, already available in Germany for the calculation of life-cycle costs can be used. However, where elaborating a life-cycle cost analysis represents a disproportionately high cost, because the relevant manufacturer's information is not available or only at a significantly high cost, it need not be done. In such cases, a profitability calculation must also be made in addition to the calculation of amortisation periods, such as for instance the calculation of the internal rate of return or of the capital value of the investment. The expected operating costs, including at least energy and maintenance costs, should also be roughly estimated.

The Federal Office for Economic Affairs and Export Control (BAFA) is responsible for verifying that companies in Germany are conducting the audits. However, there is no obligation for companies to inform BAFA when implementing an energy audit. BAFA makes checks on a random sample basis whether the audit rules are being observed and the energy auditor has the necessary qualifications.

Requirements for energy auditors

According the Act on Energy Services and Energy Efficiency Measures (EDL-G), energy auditors should comply with specific requirements about their expertise, acquired as a result of training or a professional qualification and practical experiences. No specific certification scheme is put in place. Auditors should have relevant education, evidenced by:

- a degree from a university or a technical college in a relevant subject, or
- a professional qualification as a state-certified engineer or a master's certificate or continuing training qualification in a relevant subject.

Auditors should also have gained practical work experience in energy consultancy of at least three years.

The qualification of persons with relevant accreditation certificate and performing energy audits within energy management systems under DIN EN ISO 50001 and under EMAS is considered as sufficient evidence of qualification under EDL-G.

The Federal Office for Economic Affairs and Export Control (BAFA), which is responsible in this area, keeps a public energy auditor directory (Directory of Energy Auditors) with people who have the professional qualifications necessary to carry out energy audits in businesses. The Directory is published on the website of the BAFA. Companies searching for suitable external energy auditors can use BAFA's published directory, but the selection is their own responsibility.

Energy auditors who would like to be included in the directory can provide the necessary qualifications to BAFA in advance. It is, however, also possible, to only provide the relevant documentation for expertise during the sample checks by BAFA. The regulations relating to requirements and qualifications for persons performing energy audits are outlined in a special leaflet.

With regard to auditor selection, energy auditors may be either external or internal to the companies being reviewed, as long as they meet the requirements of the regulation. If the energy audit is performed by persons from within the company, then these persons must not be directly involved in an activity that is subject to the energy audit in order to avoid conflict of interest.

An important requirement is the independence of energy auditors in order to ensure objectivity and transparency. The person performing the energy audit must be impartial towards manufacturers, suppliers or distributors.

Energy Management

German companies that operate an energy management system certified to DIN EN ISO 50001 or an EMAS environmental management system are exempted from the obligation to conduct mandatory energy audits under EDL-G, as these systems also involve an energy audit as defined by the EED.

The Third German NEEAP reports of 1,135 energy management systems certified according to DIN EN 16001 or DIN EN ISO 50001 and around 1,800 locations in Germany running an EMAS-compliant environmental management system in 2014. A later report[16] provides information of 1,650 enterprises in Germany certified under ISO 50001, or roughly 65% of worldwide ISO 50001 certifications.

Major factor that has driven the increase of this certification in Germany is the exemptions from the electricity tax. Companies must prove that they have an energy management system (certified by DIN EN 16001 and DIN EN ISO 50001) implemented in order to receive tax discounts (or alternative systems for SMEs including audits). Another factor is the regulation for Feed-in-tariffs (FIT) for electricity from renewable energy sources, under which the subsidies are passed on to electricity consumers who pay the so called EEG-levy. Exemptions from this levy are possible, when companies have a certified EMS.

The Federal Ministry for Economic Affairs and Energy is supporting the certification of energy management systems for companies through a funding programme, administered and operated by the Federal Office for Economic Affairs and Export Control (BAFA). Funding is provided for:

- Initial certification of an energy management system to DIN EN ISO 50001 (80% of qualifying expenses, but no more than EUR 8 000),
- Initial certification of an energy control system (annual energy costs under EUR 200,000; 80% of qualifying expenses, but no more than EUR 1 500),
- Purchase of sensing, metering and instrumentation technology for energy management systems (20% of qualifying expenses, but no more than EUR 8 000) and
- Purchase of software for energy management systems (20% of qualifying expenses, but no more than EUR 4 000).

Companies which have received exemptions from the electricity tax and the EEG-levy are not eligible for support under the BAFA fund.

Instruments used for SMEs

The German government has implemented a bundle of policy instruments to improve progress in energy efficiency in the industry sector, broadly supported by different governmental and non-governmental organisations and industrial associations. The instruments include subsidies and incentives as well as information instruments.

The programme Energy Consulting for SMEs and the SME Initiative for the Energy Transition and Climate Protection, supported by the Federal Government together with the German Association of Chambers of Industry and Commerce and the German Confederation of Skilled Crafts, for example, specifically target businesses. Moreover, the Federal Government finances the comprehensive

[16] C. Laur, J.-L. Harnet, European directive2012/27/EU: Transposition of article 8 related to mandatory energy audit, Beelas Group, January 2015

energy efficiency campaigns of the German Energy Agency (dena), which provide additional information for diverse target groups.[17]

The requirements of the Energy Efficiency Directive have influenced modification of some of the instruments used. Modification has been done to the major subsidy programme **'Energy Consulting for SMEs'**, run by the government-owned development bank KfW and the Federal Ministry for Economic Affairs and Energy.

The programme helped energy saving in small and medium-sized enterprises. The energy consulting programme supported SMEs with annual energy costs in excess of EUR 5 000 by providing an energy consultation from independent experts. Consultations might qualify for subsidies of up to 80% of the consultation costs. At the end of the consultation, the SME managers were given specific suggestions on economically viable energy saving measures. To help put these suggestions into action, KfW extended low-interest loans to businesses that invest in energy conservation.

Around 17 000 companies received consultations under this programme from 2008 to 2013.[18]

The subsidy programme, which was revised as per 1 January 2015, provides funds for energy consulting in SMEs that meet the requirements of energy audits according to the EU Energy Efficiency Directive. To improve consulting quality, energy consultations will only qualify for funding if they meet the audit requirements set out in the EED. Within this framework, technical support for the implementation of energy efficiency measures also qualifies for subsidies. SMEs will also be informed about contracting opportunities.

The new funding regulations provide even more funding: The subsidy ceiling has been raised to EUR 8 000. Also, funding is available not only to implement the energy consultant's proposals, but also to develop a waste heat recovery scheme. Small companies with less than 10 000 EUR in energy costs can receive up to EUR 800 in consultation subsidies.

The Federal Office for Economic Affairs and Export Control (BAFA) is handling the consultations instead of KfW. Consultation requests can be made on the BAFA website.

The Energy Efficiency Network Initiative is another successful scheme for energy efficiency in enterprises in Germany. It was initiated in 2014 as an agreement between the Federal Government and major private-sector associations and business organisations for establishing by 2020 around 500 different energy-efficiency networks among medium and large enterprises. The intention was to foster a regular, moderated exchange of experience among the network partners, and thus making an important contribution towards boosting energy efficiency.

The initiative was started with a pilot program of the Federal Government on the establishment of 30 so-called "learner-energy efficiency networks" (LEEN). Since the launch of the initiative in December 2014, 50 energy efficiency networks involving over 500 companies have started up. For 2016 the Federal Government and the associations have committed to the goal of setting up 90 new networks. An energy-efficiency network consists of 8 to 15 companies.

[17] NEEAPdBD - National Action Plan on Energy Efficiency, Federal Ministry for Economic Affairs and Energy (BMWi), Germany, December 2014

[18] BAFA website http://www.bafa.de

In 2015, practical guidelines were developed for setting up and implementing networks. Uniform minimum requirements by 2020 provide for conducting energy audits in each company, setting individual savings target and setting a savings target for the whole network based on individual goals. The networks will be assisted by qualified energy consultants. The implemented measures will be reviewed every year. An important part of the network process is the exchange of experience and ideas among partners.

Participation in an energy-efficiency network enables the companies to plan and implement investment in energy efficiency on the basis of solid data. Results from a network project funded by the Federal Government have shown that the participating companies make significantly better improvements in their energy efficiency after three to four years than the average for their sector.[19]

A coordinating office operated by the German Energy Agency (Deutsche Energie-Agentur GmbH -- dena) was set up to act as a point of contact for networks and potential initiators of networks. The office will also register and verify new networks, organise coordination processes between partners financing the initiative, and coordinate public relations activities.

A new **Energy Efficiency Network Campaign** informs companies about available funding programmes for businesses to improve their energy efficiency. Businesses can access information at an Internet site regarding subsidised measures, the amount of funding and where to apply. Depending on the measures taken and the programme, funds of up to 1,5 million euros can be requested. Among the new funding sources is the 'LEEN 100 plus' project, funded through the national climate protection initiative, and providing support for the establishment and implementation of energy efficiency networks.

In addition to the online offer, the initiative organises events with the funding bodies where network participants receive detailed, first-hand information on existing funding programmes and can exchange experiences related to funding.

The **SME Initiative for Energy Reforms and Climate Protection**, operated by the Federal government and some business associations aims to help SMEs implement the energy reforms. Under this initiative, SMEs receive support to identify energy-saving opportunities and benefit the most of them. Instruments used include education, information and communication activities. SMEs are informed about energy saving opportunities, suitable incentive programmes, and also receive assistance in taking action to conserve energy. The SME Initiative for Energy Reforms and Climate Protection has proven successful and will be maintained and refined further.

In 2012, the Economic Affairs Ministry started a funding programme entitled 'Investment grants for the use of highly efficient generic technologies in SMEs'. The programme was updated in 2014. Under this programme, SMEs can obtain financial incentives for investment in highly efficient, commercially available energy-saving technologies, based on an energy conservation plan and a thorough energy consultation. Subsidies cover up to 30% of qualifying investment costs, but no more than EUR 30 000 for individual items and EUR 100 000 for systemic initiatives. Systemic programmes only qualify if they reduce the energy consumption of the plant or system by at least 25% compared to initial levels.

[19] BAFA website http://www.bafa.de

Programmes to raise awareness among households

Information and consulting make up key elements of German energy efficiency policy. This is based on the understanding that independent and reliable information and comparative data are essential for businesses, private households and the public sector to make competent investment decisions and to be able to better understand, measure and assess their own energy consumption and the impacts of energy efficiency measures. This is why the Federal Government promotes information and advisory services for different target groups. The Federal Ministry for Economic Affairs and Energy has been providing impartial energy advice to households since the late 1970s.[20]

A number of programmes in Germany are directed to households. In their substance and context, they relate to raising awareness among households about the importance of assessing their energy consumption as a basis for planning and implementing energy efficiency measures, i.e. they raise awareness about the benefits of energy audits. The National Action Plan on Energy Efficiency – *NEEAPdBD* presents some important such programmes, briefly presented below.

The Federal Ministry for Economic Affairs and Energy (BMWi) is supporting **consulting to households provided by consumer centres**. Nationwide, consumers can get help with their energy questions from around 670 consumer centre offices and local government offices. Appointments can be scheduled by calling a central hotline or by using a free online consultation tool. Consultations are free for low-income households. Depending on the complexity of the questions, answers are received directly or the questions are transferred a second-level energy advisor at a consumer centre. Consultations are provided by 460 impartial, highly knowledgeable energy experts at the consumer centres. BMWi has tirelessly expanded its programmes over the years and indicates plans to further refine them as part of the National Action Plan on Energy Efficiency (Nationaler Energieeffizienz-Aktionsplan (NEEAP) der Bundesrepublik Deutschland).

Another consulting programme, funded by the Federal Ministry for Economic Affairs and Energy and run by the Federation of German Consumer Organisations is the '**Energy Check'**. This programme provides practical service for consumers and allows tenants and house owners to bring in experts to examine their homes for energy conservation opportunities. Energy checks are free for low-income households.

A similar programme, '**Energy check-up'**, funded by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety is directed to low-income households. The programme aims to show low-income households how to cut power use and save money. At the same time, it employs long-term unemployed people as "energy-saving assistants" to give them an opportunity to re-enter the workforce. The energy check-up is managed by the German Caritas Association and the Association of Energy and Climate Protection Agencies in Germany.

The '**House transition'** is a campaign to educate private homeowners about the benefits of home energy retrofits and enable them to contact qualified local professionals. The programme was initiated by the Alliance for Building Energy Efficiency and is supported by the Federal Ministry for Economic Affairs and Energy, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, relevant industry associations and numerous companies.

[20] NEEAPdBD - National Action Plan on Energy Efficiency, Federal Ministry for Economic Affairs and Energy (BMWi), Germany, December 2014

Consumer protection organisations and the campaign, Stromspar-Check PLUS, provide energy advice to private households. In addition to advisory services, up to the end of 2015 Stromspar-Check PLUS provided/installed simple energy-saving devices for low-income households free of charge and under certain conditions granted a subsidy for the purchase of a high energy efficiency refrigerator.

The amended Act on Energy Services and Energy Efficiency Measures provides for another possible path for raising the awareness of households and supporting them to increase the energy efficiency of their homes. Energy companies, i.e. energy distributors, distribution system operators and energy suppliers, are obligated to provide their customers with information on energy agencies or similar institutions which will make available further details with regard to energy efficiency improvement measures, comparative end-user profiles and/or objective technical specifications for energy-using equipment.

5.3 Slovakia

Legislation

The implementation of the EED in Slovakia began with a review of the Act on Energy Efficiency 476/2008 and its amendment in the form of a **new Energy Efficiency Act 321/2014**. The new Act (the Act) lays down obligations, responsibilities and measures to promote and improve energy efficiency in Slovakia and introduces rules for energy services, audits and awareness. The Act lays down rules for preparation of national energy efficiency (EE) concept, EE action plans and EE targets. It describes responsibilities of the Ministry of Economy in assessment of the potential for centralized heat supply and so called “heat map” with overview of power plants and distribution systems.

The new Act brought a number of significant changes compared to the previous one in relation to energy audits. It cancelled the obligation of energy audits in SMEs and obliged all large enterprises to perform audits every 4 years. The Act outlines the basic terminology, defines responsibilities for ministries and agencies, national authorities, heat and electricity producers, enterprises, auditors, etc. Further on, the Act laid down obligations and requirements on energy audits and auditors. The Act is further supported by Decree 179/2015 on energy audits.

In Article 7 on Energy sources and distribution, the Act describes obligations for heat and electricity producers – e.g. ensure energy efficient conversion, perform energy audits etc.

The Act also sets the obligation on the Ministry of Transport, Construction and Regional Development in cooperation with the Ministry of Economy to prepare and update every 3 years a long term investment strategy for buildings’ renovation. This includes overview of buildings, cost effective measures, plan for renovation of both public and private buildings, energy saving potential.

Supervision and enforcement of the Act is done by Slovak Trade Inspection. The Inspection may impose a fine for offence of the regulations of the Act, the size of which is different for different cases.

The national Energy Efficiency Action Plan (NEEAP) for the Slovak Republic for the period 2014-2016 was approved by the Slovak Government in July 2014 and it is already the 3rd implementing

plan serving the 2020 targets. The NEEAP includes a special section on the transposition of Article 8 of the EED.

In compliance with EED and §24 of Act 321, Slovakia established a **Monitoring system of efficient energy use** which is operated by the Slovak Innovation and Energy Agency (SIEA). Its main goal is to monitor primary energy and end-use energy in sectors according to energy efficiency action plans and to assess energy efficiency measures in order to reach the 2020 targets. The Monitoring system serves as information source for the authorities and the public. It allows calculating energy savings set by the energy efficiency action plans. Providers obliged to report to the Monitoring system are: authorities, municipalities, energy suppliers, operators of transmission or distribution networks, owners of buildings with area over 1000 m^2, condominiums etc. Providers shall monitor, analyse and send by the 31st March annually the set of data related to energy use for the previous calendar year.

Slovak Act 321/2014 is being implemented by a number of **supporting decrees**:

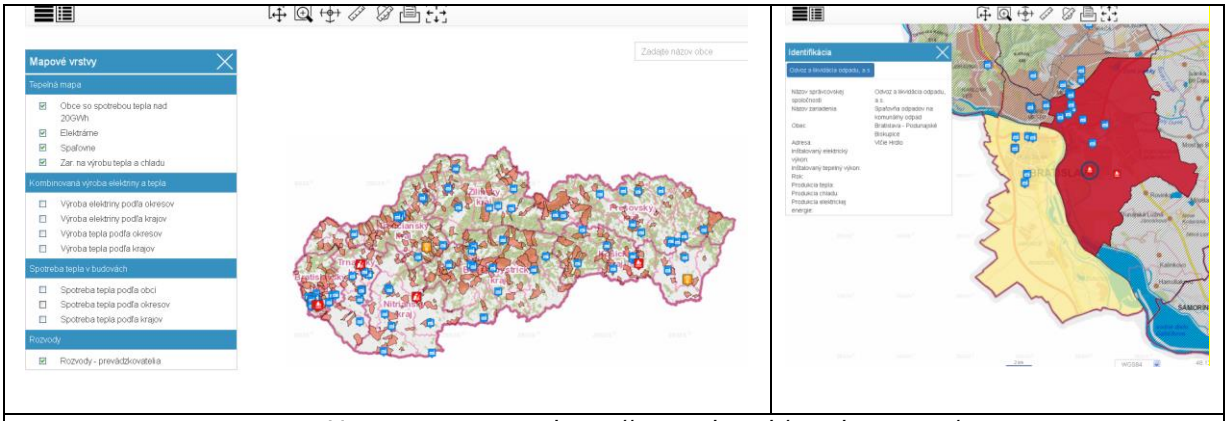
- 599/2010 on cogeneration
- 13/2016 on monitoring system, monitoring method and rules and data processing
- 179/2015 on energy audit
- 88/2015 on assessment, calculation method of efficiency of energy sources and distribution

Article 8 of the EED is covered in detail by Decree 179/2015 on energy audit. The Decree is laying down the following:

- Procedure for carrying out energy audits
- Content of written report from energy audit
- Form of the summary information sheet
- Set of data for the Monitoring system (template given in 179/2015 contains total energy saving potential, description of recommended measures, energy use and costs, environmental benefits, profitability evaluation etc.)

The transposition of the EED in Slovakia lies with the Ministry of Economy of the Slovak Republic, and the operational implementation of Article 8 - with the Slovak Innovation and Energy Agency (SIEA).

SIEA also prepared a digital **"Heat map" of Slovakia**, which is following the Act 321/2014. Map gives an overview of existing and potential centralized heat supply such as high efficiency cogeneration systems, renewable energy sources and industrial sources usable for heating and cooling.



Heat map - source https://www.siea.sk/tepelna-mapa/

Implementation for large enterprises

Energy audit is obligatory every 4 years for large enterprises – the companies which have more than 250 employees and turnover over 50 million euro and/or an annual balance sheet total exceeding 43 million EUR.

Large enterprises are obliged to:

- Perform energy audit
    - every 4 years or
    - as a part of existing certified energy management system or
    - as a part of existing environmental management system
- Keep the energy audit report and related documents until next audit
- Provide the energy audit report to the operator of Monitoring system within 30 days from after report preparation or when requested by operator.

The NEEAP informs about 614 thus defined large enterprises in Slovakia in 2012.

The duty to perform energy audits also rests with:

- electricity producers – when constructing a new electricity facility or renewing an existing electricity facility with a certain minimum output – are obliged to undertake energy audits for the purpose of showing the heat supply potential of the facility to the Ministry of Economy
- heat producers over 10 MW output are obliged to undertake energy audits for the purpose of showing the electricity (made by highly effective combined production of electricity and heat production) supply potential of the facility to the Ministry of Economy
- all organisations that request public funding for energy projects.

These requirements build on regulations of the previous Act on Energy Efficiency 476/2008, which introduced mandatory energy audits for industrial companies with energy demand higher than 5,500 MWh/year. However, compliance with this obligation was relatively low. According to the NEEAP, during the period 2011–2013, only 210 energy audits were conducted.

The State Inspection can fine large enterprises according to §29 of Act 321/2014 in amount between 5,000 and 30,000 EUR for not performing energy audit or not providing data to the national energy monitoring system.

Minimum criteria for energy audits

In general, an energy audit is a set of (nonbinding) energy saving recommendations to the company/owner prepared by a certified energy auditor. Detailed requirements, content of energy audit, its respective parts, as well as sets of data/information which need to be submitted to SIEA, are described by Decree 179/2015.

According to the Decree, the minimum coverage of the audit has to be 90% of the energy demand of the large enterprise. This covers the requirement of Annex VI for representativeness of the audits.

The energy audit process described by the Decree shall include the following activities:

- Identification of the audited object
- Evaluation of the actual condition
- Evaluation of measures including profitability calculations
- Preparation of written Energy Audit Report
- Preparation of Summary information sheet
- Preparation of set of data for Monitoring system

In general, an energy audit is a set of (nonbinding) energy saving recommendations to the company/owner prepared by a certified energy auditor. Detailed requirements, content of energy audit, its respective parts, as well as sets of data/information which need to be submitted to SIEA, are described by Decree 179/2015.

Energy Audit Report should contain:

- Identification data of enterprise, name, address, tax number etc.
- Identification data in case of physical person
- Identification data of energy auditor
- Evaluation of actual condition of the audited object
- Evaluation of measures and indication of savings, investment, profitability
- Package of recommended measures
- Profitability calculation for measures (NPV, IRR)

Owners of large enterprises are obliged to keep the energy audit report and related documents until next audit. They also need to provide the energy audit report to the operator of the Monitoring system within 30 days after the report preparation or when requested by the operator.

Requirements for energy auditors

Energy audits can be performed only by certified energy auditors - physical persons with required qualification and technical education. Auditors obtain a certificate by completing a course and

passing an exam organized by the Slovak Innovation and Energy Agency (SIEA). Certified auditors are registered by the Ministry of Economy and SIEA in a database of energy auditors. Internal auditors are allowed if registered in the database. Auditors undergo update training minimum every 3 years.

Minimum required education for energy auditors is secondary school in technical field or higher education in technical, economic or natural science fields. Minimum professional experience in energy consulting and technical-economic analysis in energy conversion, energy distribution and use is required, different for the different levels of education:

- five years in case of completed full secondary education,
- three years in case of higher education, lower university degree,
- two years in case of acquired Master's degree.

Energy Management

According to a country report for Slovakia from 2013[21], there was a great need for energy management systems in the country, especially in the industrial sector. Nevertheless, a market for energy management systems has yet to develop.

Until 2014, only twelve ISO 50001 certificates were issued in Slovakia, eleven of them in 2013.[22]

The use of STN EN ISO 50001 was introduced by Slovak National Accreditation Service (SNAS) in 2014. No specific activities could be identified in Slovakia that explicitly address the introduction of energy management systems.[23]

Instruments used for SMEs

For medium and small enterprises energy audit is on voluntary basis. However energy audit is required when enterprises apply for co-financing of an energy project from public funds .

In Slovakia, support funding was provided for energy audits to SMEs by the **Operational programme "Quality of Environment".** The Programme was approved by EC in 2014 with available total funds of 3.13 billion EUR. The programme has 4 main priority axes, with 'Energy-efficient, low-carbon economy in all sectors' one of them.[24] Under this priority, Specific Objective 4.2.1: Reduction of energy intensity and increasing the use of RES in enterprises is included. This specific objective aims at introducing programs for support for energy audits at SMEs for objective determination of potential energy savings, based on which measures in the area of energy efficiency and use of RES will be proposed. No less important will also be support for implementation of the

[21] Country Report Slovakia, Energy Efficiency in Europe, Assessment of Energy Efficiency Action Plans and Policies in EU Member States, 2013

[22] ISO Survey 2014, www.iso.org

[23] A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems, Report on the fulfillment of obligations upon large enterprises, the encouragement of small- and medium-sized companies and on good-practice, European Commission, April 2016

[24] http://www.op-kzp.sk/wp-content/uploads/2015/07/OP_QE_EN_schvaleny-EK.pdf

measures arising from the energy audits. Priority will be given to projects aimed at energy savings at small and medium enterprises.

Small and medium enterprises which performed energy audit co-financed from public funds or aid programs financed by international financial institutions are obliged to:

- Keep the energy audit report and related documents until next audit
- Provide the energy audit report to the operator of Monitoring system within 30 days from after report preparation or when requested by operator.

Calls for application, documents, legislation and other information related to operational programme "Quality of Environment" are published on http://www.op-kzp.sk/ .

Individual applications for financing of projects are evaluated by technical assessors. These are the experts who apply to calls for selection of assessors, published on the programme web page and satisfy the minimum criteria.

In the frame of "Quality of Environment" programme, SIEA prepares 4 national programmes:

- Free energy consultancy
- Support of small equipment for utilization of renewable energy sources in households
- Information platform for energy effective low carbon economy and audits of public buildings
- Extension of Monitoring system

Programmes to raise awareness among households

Awareness raising on energy efficiency and energy services in general are responsibility of the Slovak Innovation and Energy Agency under the Ministry of Economy. Since 2010, the Agency has been providing public information and advisory activities under the 'Living with Energy' national project (Measure 2.2 of the Operational Programme Competitiveness and Economic Growth). Since May 2010, advice centres have been set up in Trenčín, Banská Bystrica and Košice to provide free individualised advisory services to the general public and professionals by means of toll-free telephone lines, email correspondence and personal consultations. Consultancy is also provided on the opportunities to finance sustainable energy measures (for the public, towns and municipalities, enterprises, etc.). The Slovak Innovation and Energy Agency has published more than 40 types of documents on energy savings and the use of RES, and has held more than 120 professional events. Consulting is also available via a website. This measure is being continued under the Operational Programme Environmental Quality 2014–2020.

There are a number of support programmes for energy efficiency projects in the residential sector:

- Soft loans for renovation of apartment blocks
- Grants for repairs of system failures in apartment blocks
- SLOVSEFF II (Sustainable Energy Financing Facility Developed by the European Bank for Reconstruction and Development)
- MUNSEFF(Municipal Instrument to Finance Sustainable Energy Investments in the Slovak Republic)

- State grants for solar collectors and biomass boilers for households.

Since 2010, the Slovak Innovation and Energy Agency has been responsible for raising energy-saving awareness among children and young people under the 'Living with Energy' national project. The 'Auntie Eta's Advice' information materials are used in more than 50 primary schools. Slovak Innovation and Energy Agency experts have visited schools where, as part of an expert programme, they explain energy savings to the children. In addition to the annual 'Energy Efficiency Marathon', aimed at highlighting the principles of energy efficiency in the production and distribution of energy, the Slovak Innovation and Energy Agency also regularly organises lectures at the youth club hosted by the Agency's offices in Banská Bystrica. This measure is being continued under the Operational Programme Environmental Quality 2014–2020.

5.4 Sweden

Legislation

The Swedish Legislation transposing Art. 8 of the EED was adopted on 30 April 2014 in the form of the Act on Energy Audits in Large Enterprises (SFS 2014:266). The Act entered into force on 1 June 2014 and entailed an obligation for all large companies to perform an energy audit every four years.

The implementation of the Act was supported by adopting Regulation SFS 2014:347 on energy audits in large companies and Instructions by the Swedish Energy Agency (STEMFS 2014:2). In addition, the Energy Agency has published a FAQ document on their web page that is continuously updated.

Sweden's energy efficiency policy is guided by its National Energy Efficiency Action Plans (NEEAP), required by the EU Energy Services/Energy Efficiency Directive. The third NEEAP, submitted to the European Commission in 2014 includes a special section on Article 8 of the EED, where the major activities in Sweden for implementing the respective requirements are outlined.

Energy efficiency policy in Sweden is responsibility of the Ministry of the Environment and Energy. The Swedish Energy Agency (the Agency), which is working for the promotion of energy efficiency and renewable energy, is also responsible for some policy measures related to the implementation of the EED.

Implementation for large enterprises

The Act on Energy Audits in Large Enterprises (the Act) imposes obligation on all large companies in Sweden to conduct energy audits at least every four years. According to the Act, large enterprises are defined as enterprises having at least 250 employees and an annual turnover of more than EUR 50 million or an annual balance sheet total of more than EUR 43 million.

On the basis of the definition of large enterprises, there are approximately 1,500 enterprises in Sweden that have more than 250 employees and which could be affected by the requirement to carry out an energy audit. Analysis of the target group shows that a bit less than 30% of large enterprises in the group are represented by the manufacturing industry.[25]

[25] Sweden's Third National Energy Efficiency Action Plan, 2014

The Swedish legislation concerning the EED is also applicable to government and municipally controlled organisations and companies providing goods and services. This has been decided after a national discussion specifically addressing the inclusion of municipalities under the obligations set with the Act on Energy Audits in Large Enterprises.

Exemptions of the obligation under the Act apply to enterprises that have already implemented audits within the framework of a certified energy or environmental management system that comply with the minimum criteria of the EED (i.e. certified according to international ISO standard, European EN standards, Swedish SS Standard or equivalent requirements).

According to the Act, large companies have an obligation to conduct quality-assured energy audits at least every four years. As a main rule by the EED, the first energy audit has to be executed by 5 December 2015. However, during the introduction of the Act, the Swedish Energy Agency has developed a special three steps process to enable enterprises to conduct their first energy audit. The first step is for companies to submit a report by 5 December 2015 to provide information on whether or not the company is affected by the law, to inform about their activities covered by the Act and the parts of the business to be energy-audited. The second reporting will be in the beginning of 2017. This provides that each Swedish entity is obliged to make its own assessment whether it is required under the Act to perform an energy audit or not.

The Swedish Energy Agency is also responsible for supervision and evaluation of the implementation of the Act on energy audits. All enterprises, obliged to perform an energy audit, shall provide the Agency with information of the energy audit performed, the total energy consumption for buildings, operational energy and transportation, as well as information regarding proposed cost-effective and energy saving measures. The Agency may issue orders against a non-complying large entity. Failure to comply with the obligations can result in sanction which may include a fine based on the company's total turnover.

The requirement for energy audits in Sweden was not introduced on bare field. Swedish companies have good experience with the Programme for improving energy efficiency in energy intensive industries (PFE), started in 2005. This programme is a type of a voluntary agreement between individual enterprises and the Swedish Energy Agency. The agreement means that an enterprise may, if it meets the requirements of the PFE, receive a five-year exemption from energy tax on electricity of 5 SEK per MWh (approximately 0,55 EUR/MWh). In return, participating companies must carry out an energy audit and introduce a certified energy management system, and implement the identified energy efficiency measures with a shorter repayment period than three years.

More than 100 energy-intensive companies participated in the Programme. The results from the first five-year programming period show that the enterprises have reported implementing measures that have been estimated to give an improvement in electricity efficiency of 1.45 TWh per annum.[26]

The guidelines on State aid for environmental protection, which were issued in 2008, have resulted in more limited opportunities for granting tax exemptions to enterprises. Consequently, the Programme for Improving Energy Efficiency was repealed at the end of 2012. Most of the companies involved concluded their programme period in 2014, and the last group of companies included will finish their programme period in 2017.

[26] Sweden's Third National Energy Efficiency Action Plan, 2014

Minimum criteria for energy audits

Regulation SFS 2014:347 on energy audits in large companies transposes the minimum criteria of energy audits as set out in Annex VI of the Energy Efficiency Directive without adding major additional requirements.

The energy audit shall be performed with such detail that it gives a representative picture of the total energy use of the enterprise, including a general description of its total energy consumption. The extent of the representativeness is assessed on a case-by-case basis, taking into consideration the business of the specific company. In Sweden, there is no specific minimum value of representativeness in terms of energy consumption as seen in some other countries (e.g. in Germany an energy audit is considered representative if it covers at least 90% of the energy consumption of the enterprise). Also, the audit has to be detailed enough to allow identification of specific energy saving measures.

The mandatory energy audits of large enterprises in Sweden shall be conducted in accordance with international ISO standard, European EN standard, or Swedish SS standard. Companies have to maintain the records of energy audit reports for 7 years.

Requirements for energy auditors

The energy audits may be carried out by certified energy auditors, in-house experts are also allowed to do the audits if certified. Certification is granted on the basis of education level and work experience under the following requirements:

- a technical college degree and at least three years of working experience, or
- a relevant university degree and at least four years of work experience, or
- technical secondary education or advanced vocational training and at least five years of work experience, or
- at least ten years of experience.

In all cases the work experience has to be gained in the fields of energy efficiency, energy audits and energy management. Auditors need to prove their knowledge by passing a test, including a written and practical part. The certification of energy auditors is valid for a period of five years.

The person conducting the energy audit has to be independent in relation to the business audited. In case of internal auditor (employee of the enterprise), the person doing the audit should fulfil the requirement of independency, i.e. he cannot be directly involved in the activity that is to be audited.

The Swedish Energy Agency ensures that there is a list of certified auditors at its web page.

Energy management

Enterprises that have certified energy or environmental management system, including audits meeting the minimum EED criteria, are excluded from the obligation to conduct energy audits under the Act on Energy Audits in Large Enterprises. The management systems have to be certified according to international ISO standard, European EN standards, Swedish SS Standard or equivalent requirements.

Sweden has good experience with energy management. In response to the needs of the PFE programme for improving energy efficiency in energy intensive industries, Sweden has developed an energy management standard in 2003. The standard was based on the same main principles as ISO 14001: Plan, Do, Check, Act. With its experience, later Sweden has played an important role in the process of developing the international standard ISO 50001 for energy management systems (EnMS), which was adopted in 2011.

The PFE programme has been an important factor for promoting energy management systems in Swedish industries: of all Swedish companies with certified energy management systems, 95% has participated in the PFE programme.[27]

A certification scheme for energy management systems has been instituted in Sweden since 2003 when the first national standard was established. The companies in the certification scheme implement the EnMS on a voluntary basis.

In order to promote the implementation of EnMSs in Swedish companies, a number of initiatives and programmes were implemented. The Swedish Energy Agency has published handbooks and examples of different steps in the implementation process of an EnMS, and also held conferences and seminars on national and regional levels. The national programme targeting energy-intensive industries (the PFE programme) had a key role for promoting energy management. Another important programme is the EnMS light, comprising a Swedish EnMS guide developed to make it easier for small and medium sized companies to work with energy management. The “EnMS light tool” is an interactive guide of the process of implementing a simplified EnMS. It was produced in a network called ENIG, which was formed with the purpose of promoting energy efficiency in Swedish industry.

Instruments used for SMEs

The Swedish Energy Agency is promoting energy efficiency in companies in a number of ways, e.g. by funding support, demonstration projects, network activities, seminars and information.

According to the 2014 NEEAP, the existing energy audit support scheme for SMEs in Sweden provides support for implementation of Article 8 (2) of EED. The support is provided in the form of what are known as **energy audit checks**. This aid may be granted to enterprises with energy consumption in excess of 500 MWh per annum or for farms with at least 100 animal units, even if the energy consumption is lower. The scheme was introduced with a relevant Ordinance in force since 1 January 2010, and the aid amounted to the cost of an energy audit. According to the assessment, the main impact of energy audit checks has been greater knowledge of specific issues concerning energy efficiency among enterprises, which in turn forms the basis for the measures. The data from the audits were collected and verified by the Swedish Energy Agency. A review of past support for energy audits (2010 – 2014) has been conducted.[28]

As a result of the Government's revision of the Ordinance on state aid for energy audits which took effect on 1 January 2015, the Swedish Energy Agency has reviewed the regulations for the aid directed at SMEs. This includes companies with an energy consumption of 300 MWh per year and

[27] Swedish experiences from Energy Management Systems in industry, Swedish Energy Agency, August 2013

[28] Energy in Sweden 2015, Swedish Energy Agency, December 2015

agricultural holdings with more than 100 animal units. The aid compensates 50% of the energy audit's cost, but with a maximum of 50,000 SEK. The Swedish Energy Agency has also taken decisions on new regulations applicable from 18 June 2015. These contain provisions on the energy audit's content, the information to be provided in the application for aid and in conjunction with the request for payment of aid, and the information to be provided prior to monitoring and evaluation of the aid.[29]

Information instruments are intended to provide information on the energy demand of entities and on opportunities to improve their energy efficiency. Examples of this type of instrument are the **energy efficiency networks** in Sweden where companies exchange their experiences regarding energy efficiency.

National, regional and local networks have been created to enhance energy efficiency of SMEs, to develop methodology and energy-efficient technology as well as to promote the dissemination of best practices. There are national networks for energy-intensive SMEs, while regional and local networks cover all enterprises. These networks involve the regional energy offices and the local energy advisors.

Several municipalities in Sweden joined forces in 2006 in Project Highland to offer energy audits for SMEs. This resulted in 340 two-day energy audits in six municipalities. The measures focused primarily on support functions, such as lighting and space heating, rather than on core production processes. In addition, the energy audits from the evaluated companies resulted in energy conversions to district heating and on-site biofuel boilers. The companies surveyed after the programme noted that it was easier to receive funding when having an audit report to rely on.

There are examples of currently active networks of different industries.

One example is the network Energy Efficiency in the Sawmill Industry, EESI, which started in 2010. Its objective is to demonstrate that specific energy consumption in the sawmill industry can be reduced by 20% by 2020. A 20% decrease in energy use within the Swedish sawmill industry would mean a 1 200 GWh savings in heat energy plus 300 GWh savings in electricity. This result must be achieved through a programme to improve energy efficiency, which includes , above all, an audit of energy consumption (using energy audit checks) for energy modelling opportunities and a plan for demonstrations at selected sawmills.

Another network, ENIG, is a Swedish energy efficiency network targeting SMEs in the manufacturing sector. It was established in 2009 and is run by the Swedish Research Institute for Industrial Renewal and Sustainable Growth (Swerea). The Swedish Energy Agency is a partner and funder. ENIG creates, collects and disseminates information on energy efficiency technologies, practices and methods.

Both ENIG and EESI are now in stage 2, which is more operational in nature and focuses on implementation whilst gradually increasing the extent to which the results are used.

The GeniAL project stands for Common Energy Networks in the Aluminium Industry. The aim of the project is to increase knowledge, identify and implement measures, and make tools available for

[29] Energy in Sweden 2015, Swedish Energy Agency, December 2015

long-term improvements to energy efficiency in the aluminium industry, through cooperation in sector-specific councils and networks.

Programmes to raise awareness among households

The Swedish government invests heavily in information and advice for households on how to save energy. Energy and climate advisory services are conducted in all 290 Swedish municipalities. Each municipality has an energy adviser to whom people can turn for help and guidance. The focus of the advice is impartial, free and technology-neutral and addresses the following target groups: the general public, small- and medium-sized enterprises and organisations and associations. The purpose of the energy and climate advisory services is to communicate locally and regionally adapted knowledge on energy efficiency, energy use and climate impact.

It is considered that municipal climate and energy advice fulfils the EED provisions on promoting efficient energy consumption to small energy consumers, including household customers. The Swedish Government has decided to continue funding energy and climate advisers up to and including 2017.[30]

The Swedish Energy Agency is also working to disseminate information and raise awareness, including through its website. In addition, information about energy efficiency measures is also available from relevant players, for example from the various networks of market players, public sector players (the Sustainable Municipalities project, energy-efficient authorities, etc.) and the municipal energy and climate advisers.

The Swedish Energy Agency's programme for a Sustainable Municipality is a unique cooperation between the Agency and 37 of the country's municipalities. The Swedish Energy Agency contributes with knowledge, information and networks which facilitate and make the work done by each municipality more efficient. The Sustainable Municipality focuses on several different theme areas where the municipality plays a key role and has a lot to gain by adopting a long-term and systematic approach. These include for instance making municipal operations more energy-efficient, organising information campaigns directed to its inhabitants and companies, dissemination of energy-related information, and energy planning, among others. Support by the Energy Agency to municipalities in the context of Sustainable Municipality consists of knowledge transfer, project funding for cooperation and assistance structures for networking. The program completed its third phase in 2014. The two previous phases of the program were carried out in 2003-2007 and 2008-2011.

5.5 Czech Republic

Legislation

The latest legislative document transposing the EED in Czech Republic is the **Amendment 103/2015** which is updating the previous Act on Energy Management 406/2000.

As specified by §3 of the Act, the national Energy Concept for period of 25 years is a responsibility of the Ministry of Industry and Trade (Ministry). Evaluation of Energy Concept implementation is done every 5 years.

[30] Sweden's Third National Energy Efficiency Action Plan, 2014

Every year the Ministry shall prepare State programme to support of energy savings and use of renewable and secondary energy sources (financing source is state budget).

Further on, the act is laying down requirements for owners of electricity or heat power plants and suppliers of boilers and stoves related to minimum efficiency of energy use.

With regards to energy efficiency in buildings, §7 describes who and when should document compliance with minimum energy performance requirements of new buildings and buildings after major renovation.

Buildings with floor area over 1500 m^2, owned by public authority or entity established by public authority, shall report to Monitoring system published by the Ministry.

The Act further provides requirements on building energy certificates, energy labelling of equipment, eco-design and energy audit and energy assessment, energy services agreement.

Energy audit is obligatory every 4 years for large enterprises unless there is existing and certified system of energy management or environmental management (based on standards ČSN EN ISO 50001, ČSN EN ISO 14001). Energy audit can be performed by internal company auditor (specialist) who has corresponding training and certificate from accredited institution.

Energy audit is obligatory for investors, condominiums, building owners in case when the energy use is higher than limiting energy use as specified below.

Physical and juridical persons are obliged to perform energy audits if the total energy use of all buildings owned by corresponding person exceeds amount of 35 000 GJ (9 722 MWh), and only for those buildings with energy use more than 700 GJ (194 MWh).

State and county administration units and municipalities are obliged to obtain energy audits if the total energy use of all buildings owned exceeds amount of 1,500 GJ (417 MWh), and only for those buildings with energy use more than 700 GJ (194 MWh).

Legislation in Czech Republic uses term „energy specialist“ which is general name for experts performing audits, assessments, certificates as well as inspections of boiler and airconditioning.

The Ministry shall also prepare National energy efficiency action plan consisting of National action plan for increasing number of the NZEB and Strategy for renovation of residential and commercial buildings.

List of the legislation related to EED in Czech republic:

- Act 406/2000 on energy efficiency
- Act 458/2000, energy law
- Decree 78/2013 on energy efficiency of buildings.
- Decree 480/2012 on energy audit and assessment
- Decree 118/2013 on energy specialists
- Decree 193/2007 on efficiency of energy use in distribution of heat
- Decree 194/2007 on rules for heating and hot water supply, specific use for heating and hot water, requirements on control systems for heat supply to end users

- Decree 441/2012 on minimum efficiency of energy use in electricity and heat production
- Decree 193/2013 on inspection of air conditioning systems
- Decree 194/2013 on inspection of boilers and heat distribution systems

Implementation for large enterprises

There is no definition of large enterprises mentioned in Czech legislation so they are understood to be enterprises which are not SMEs – defined by EC 2003/361/ES (companies which have more than 250 employees and turnover over 50 million euro and/or an annual balance sheet total exceeding 43 million EUR).

When calculating the number of employees and turnover, enterprises shall take into account their organisation type which could be autonomous enterprise (has no ownership or voting rights in other companies), linked (one enterprise holds a majority of the shareholders' or members' voting rights in another) or partner (owns 25-50% of the capital or voting rights in another).

For partner enterprise - number of employees and the financial data are determined by adding the proportional percentage of number of employees and capital or voting rights (whichever is the higher) of the partner company to the data from the accounts.

For linked enterprise which is not an autonomous or partner enterprise, the number of employees and financial data shall be determined added up accounts of all linked companies.

Large enterprises were supposed to perform energy audit by the 5th December 2015 (fixed date by the directive). Amendment 103/2015 entered into force in July 2015 so only very short time was given for enterprises to meet the requirement. Therefore the State Energy Inspection gave additional time for energy audits until in 2016.

Fine from State Energy Inspection for failing to meet these requirements can be up to 5 mil CZK (approx. EUR 185 000).

Minimum criteria for energy audits and energy assessments

Main requirement for energy audits and assessments are laid down by Act 103/2015 and Decree 480/2012. Audit and assessment are two different processes – audit requires evaluation of all energy flows, whether owner wishes to implement measures or not and assessment allows evaluation of specific selected/required parameters.

Energy audit shall contain:

- Title page
- Identification data
- Description and evaluation of actual condition
- Recommendations for energy efficiency measures
- Alternatives of measures
- Selection of optimal alternative
- Other documents

Energy audit is valid until major renovation/change of the object.

Energy assessment compared to audit is a simpler process. Investors, condominiums and building owners shall obtain energy assessment for:

- Technical, economic and environmental feasibility of alternative energy supply systems for new buildings or buildings under major change with installed power over 200 kW.
- Costs and benefits of high efficiency cogeneration in case of new power plant over 20 MW, except those with operation less than 1 500 h/year and nuclear plants
- Costs and benefits of connection and utilization of waste heat source (including cogeneration) within 1,000 m distance, over 20 MW power.
- Costs and benefits of connection and utilization of waste heat from industry within 500 m distance, over 20 MW power.
- Feasibility of projects related to increased energy efficiency of buildings, energy use, decreasing emissions etc.

If the obliged person fails to carry out the mandatory energy audit and/or assessment, a fine up to CZK 5 000 000 (approx. EUR 185 000) can be imposed. If the successful execution is not notified to the Ministry of Industry and Trade, a fine up to CZK 200 000 (approx. EUR 7 400) can be imposed.

Requirements for energy auditors (specialists)

Energy specialist qualification scheme is available in the Czech Republic. Energy specialists are natural persons holding a certification granted by the Ministry of Industry. Requirement on energy specialists are:

- University technical education with diploma with 3 years experience in the field of energy and energy efficiency or secondary technical education with 6 years experience.

License is provided to specialists after passing an exam (oral and written). Candidates for exam can apply to the Ministry of Industry and Trade. Exam is organized by State energy inspection and committee. There is a number of training courses provided by different organizations.

Database of energy specialist is controlled by the Ministry of Industry and Trade. The register of energy specialists is publicly accessible.

Under the new EED, energy audits may be conducted by a company's internal specialists, provided that the quality of auditing is efficiently controlled. According to the 3rd NEEAP of 2014, under Czech national legislation energy audits could not be conducted by a company's internal specialists in order to safeguard independence. This specific regulation is not mentioned in later documents – 4th NEEAP of 2016.

Energy management

As other measures to promote energy efficiency, the Czech Republic considers in particular introducing the energy management system. As given by Act 406/2000 and Amendment 103/2015, large enterprises which have an Energy Management System (or Environmental Management System) implemented and certified by accredited person, are not obliged to perform energy audits.

The Act doesn't provide further details, only refers to the related standards. The process of energy management and requirements are specified by ČSN EN ISO 50001 on Energy management system. For environmental management system, ČSN EN ISO 14001 shall be followed.

Until 2014, only 32 valid certificates ISO 50001 certificates were issued in the Czech Republic, 16 of them in 2013.[31]

Energy management is based on principle Plan – Do – Check – Act. The main benefits of correct energy management system are:

- Compliance with legislative requirements
- Increasing the energy efficiency and decreasing emissions of greenhouses
- Improving the image/profile
- Competitiveness

Moreover, energy management system is a requirement for applicants for financial support from the Operational Programme 'Environment' for the period 2014 – 2020. There are two basic components which are evaluated:

- Technical part of energy management – boundaries, monitoring, analysis, planning and adjustment
- Personal part of energy management – responsibilities.

A person who is responsible for energy management system should have university degree of technical education and minimum 2 years practical experience in energy management system.

The Ministry of Industry and Trade has launched a State programme EFEKT 2016 for energy savings and renewable energy for the year 2016. One of the supported areas is also implementation of ČSN ISO 50001. Eligible applicants are regions and cities with more then 20 000 inhabitants. The support is limited to 500 000 CZK (18 500 Euro) and 80% of the costs.

Instruments used for SMEs

The main instrument is the Operational programme Enterprise and Innovations for Competitiveness (EIC) 2014 – 2020 prepared by Ministry of Industry and Trade, financed by European Regional Development Fund. The Programme is a continuation of successful programme "Enterprise and Innovations" from 2007-2013. The Ministry is acting as a control body and the agency CzechInvest is implementing programme activities.[32]

The EIC Programme is prioritizing support to the SMEs which constitute a major proportion of business in Czech Republic. The Programme will finance projects via grants, soft loan or guarantees or their combination. Total allocated amount is 4 331 mil EUR, which are to be distributed as follows: 45% for small enterprises, 35% for medium enterprises, and 25% for large enterprises.

Programme priorities are:

[31] ISO Survey 2014, www.iso.org

[32] English information http://www.mpo.cz/dokument169167.html

1. Raising the number of businesses capable of extending the technological boundaries of their industry, with emphasis put on the development and interconnection of corporate research, development and innovation capacities with their surroundings;
2. Developing entrepreneurship and lower-order innovation, i.e. modernisation and development projects focusing especially on support for the implementation of new business plans, including the development of services resulting in an increase in businesses' competitive advantage in the international environment;
3. Shift towards an energy-efficient, low-carbon economy consisting mainly in improving the energy efficiency of the business sector, utilizing renewable energy sources, modernising energy infrastructure and introducing new technologies in the management of energy and secondary raw materials;
4. Facilitating the development of entrepreneurship, services and access to government services by means of high-speed Internet access and a wider choice of information and communication technology services ("ICT"), as the competitiveness of information society is based on the efficient use of advanced ICT services.

Programmes to raise awareness among households

The Ministry of Environment launched programme The Green Savings[33], which is operated by State Environmental Fund. The main focus is on support for heating installations utilizing renewable energy sources but also energy savings in reconstructions and new buildings.

Czech Republic has raised funds for this programme from the sale of emission credits under the Kyoto Protocol on greenhouse gas emissions.

Applicants eligible for the subsidy are owners and builders of family and multiple-dwelling houses. A call for applications for public buildings is being prepared at the moment.

One of the requirements in order to obtain a grant from programme is obligatory use of such materials, equipment and services, which meet given criteria and are registered (free of charge) in the Database of products and technology or Database of technical suppliers.

[33] http://www.zelenausporam.cz/sekce/582/about-the-green-savings-programme/

6 REFERENCES

Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, http://eur-lex.europa.eu

Implementing the Energy Efficiency Directive – Commission Guidance, European Commission, 6.11.2013

A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems, *Report on the fulfillment of obligations upon large enterprises, the encouragement of small- and medium-sized companies and on good-practice*, European Commission, April 2016

Guidance note on Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC, *Article 8: Energy audits and energy management systems*, European Commission, 6.11.2013

The Coalition for Energy Savings, *EU Energy Efficiency Directive (2012/27/EU) - Guidebook for Strong Implementation*, 2013

Energy Audits for Europe, Assessment of the transposition of Article 8 of the Energy Efficiency Directive (2012/27/EU) into Member States Legislation, Transposition Study, EUROCHAMBERS, 17 June 2015

Prof. Dr. Wolfgang Eichhammer & Dr. Clemens Rohde, *Enhancing the impact of energy audits and energy management in the EU, A review of Article 8 of the Energy Efficiency Directive*, European Council for an Energy Efficient Economy, 2016

Daniele Forni, ENEA/FIRE, Italy, *Energy services and ESCOs, energy auditing, solving administrative barriers*, Core Theme Series Report 5: Concerted Action Energy Efficiency Directive, July 2015

Richard Eaton, Mark Johnson, A Study on Energy Efficiency in Enterprises: Energy Audits and Energy Management Systems, *Implementation of national minimum criteria for energy audits, in line with Annex VI of the Energy Efficiency Directive*, European Commission, October 2015

Christiane Egger et al., *Survey Report 2015: Progress in energy efficiency policies in the EU Member States - the experts perspective*, Findings from the Energy Efficiency Watch Project

C. Laur, J.-L. Harnet, *European directive2012/27/EU: Transposition of article 8 related to mandatory energy audit*, Beelas Group, January 2015

National Action Plan on Energy Efficiency, Federal Ministry for Economic Affairs and Energy (BMWi), Germany, December 2014

Annual report on the implementation of the National Energy Efficiency Action Plan 2014–2020, Republic of Bulgaria, Ministry of Energy, March 2016

Accelerating Energy Efficiency in Small and Medium-sized Enterprises, OECD/IEA, 2015

Deloitte*, EU Energy Efficiency Directive, National Implementation in selected European Countries*, 30.11.2015

Guidelines for Energy Audits in accordance with the statutory provisions of §§ 8 ff. EDL-G, Federal Office for Economic Affairs and Export Control, 2015

Paul Waide, *The Scope for Energy Savings from Energy Management*, 2016

Sweden's annual report for 2016 under Article 24(1) of Directive 2012/27/EU of the European Parliament and of the Council on energy efficiency, Ministry of Environment and Energy, 19 April 2016

Sweden's Third National Energy Efficiency Action Plan, 2014

Energy in Sweden 2015, Swedish Energy Agency, December 2015

A cross-border guide to Energy audits, Linklaters, October 2015

Swedish experiences from Energy Management Systems in industry, Swedish Energy Agency, August 2013

Energy Policies of IEA Countries: Sweden, 2013 Review, IEA